Comprehensive Conservation and Management Plan

A Blueprint for the Bays

Draft Final Revision of the 2003 CCMP
In accordance with EPA guidance dated May 2016

Submitted for U.S. Environmental Protection Agency review
January 28, 2019

Contents

Acronyms and Abbreviations

AGM	Associated Grantmakers of Massachusetts
ANEP	Association of National Estuary Programs
ARCGIS	Proprietary GIS display software
BCG	Biological Condition Gradient
CCMP	Comprehensive Conservation and Management Plan
Chla	Chlorophyll a
CUAHSI	Consortium of Universities for the Advancement of Hydrologic Science
CWA	Federal Clean Water Act
CZM	MA Office of Coastal Zone Management
DCR	MA Department of Conservation and Recreation
DEP	MA Department of Environmental Protection
DER	MA Department of Fish and Game, Division of Ecological Restoration
DMF	MA Department of Fish and Game, Division of Marine Fisheries
DO	Dissolved Oxygen
EDA	Estuary Delineation and Assessment
EEA	Executive Office of Energy and Environmental Affairs
EPA	United States Environmental Protection Agency
FEGS	Final Ecosystem Goods and Services
FTE	Full-time Equivalent
GIS	Geographic Information Systems
ISMN	Integrated Sentinel Monitoring Network
LGC	Local Governance Committee
MACC	Massachusetts Association of Conservation Commissions
MassBays	Massachusetts Bays National Estuary Program
MassDOT	MA Department of Transportation
MET	Massachusetts Environmental Trust
MGD	Million gallons per day
MIT	Massachusetts Institute of Technology
MOTN	Marine and Oceanographic Technology Network
MS4	Municipal Separate Storm Sewer Systems
MT	Metric ton
MWRA	Massachusetts Water Resources Authority
NEIWPCC	New England Interstate Water Pollution Control Commission
NEOSEC	New England Ocean Science Education Collaborative
NEP	National Estuary Program
NEPORT	NEP Online Reporting Tool
NERACOOS	Northeast Regional Association of Coastal and Ocean Observing Systems
NGO	Non-governmental organization
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NROC	Northeast Regional Ocean Council
PE	Program Evaluation
QAPP	Quality Assurance Project Plan
RAE	Restore America's Estuaries
RC	Regional Coordinator
RCC	Restoration Coordination Center (Cape Cod)

Acronyms and Abbreviations, continued

RPA	Regional Planning Agency
RSP	Regional Service Provider
SSU	Special, Sensitive or Unique (marine species or habitats)
STAC	Science and Technical Advisory Subcommittee, MassBays
TNC	The Nature Conservancy
TTOR	The Trustees of Reservations
UMCES-IAN	UMd Center for Environmental Studies, Integration and Application Network
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
YOY	Young of Year

Introduction: A Blueprint for the Bays

All National Estuary Programs are required under Clean Water Act (CWA) §320 to prepare a Comprehensive Conservation and Management Plan (CCMP). These plans, typically 8 to 10 years in scope, guide habitat protection and restoration efforts in the Estuaries of National Significance. The Massachusetts Bays National Estuary Program (MassBays NEP) presents this document in accordance with the legislation, and the guidance developed by the U.S. Environmental Protection Agency (EPA) for its implementation dated May 3, 2016 (Appendix A). Any CCMP must include "goals and objectives and provides a long-term framework for action… [and] strategies to: monitor progress, finance CCMP implementation, and communicate with stakeholders." As a CCMP is required for designation as an NEP, each of the 28 programs is required to either Revise (with major changes) or Update (with minor changes) their existing CCMP. MassBays has determined that a Revision to the existing CCMP is needed. Section I makes the case for a revised CCMP, and the basis for the revision presented here. Section II ties the CCMP to §320 of the Clean Water Act.

The remaining sections of the document describe the MassBays planning area (Section III) and existing means for assessing conditions and trends in the Bays (Section IV), articulate the environmental and management challenges that prompted our Goals (Section V) and the proposed Strategies and Actions we will undertake to respond to those challenges (Section VI).

We look forward to working with partners across the Bays – at the local, state, and federal levels – to implement this comprehensive plan. We have designed this plan to ensure that investments of time, money, and expertise will be directed to addressing challenges and will result in concrete results. With your help, grant monies will make more data available to decision makers, research will inform practical actions, and community investments will result in restored and resilient ecosystems.

I. MassBays Comprehensive Conservation and Management Planning

I.i. Why Now?

MassBays' first CCMP was completed in 1996, and subsequently updated in 2003. In the 15 years since that update, environmental conditions, management priorities, and agency capacities have changed significantly:

- *New programs are in place,* including NPDES MS4 regulations requiring municipal stormwater remediation, a state-wide Environmental Justice Policy published in 2002 and updated in 2017, and reorganization of the Environmental Secretariat to incorporate Energy, and form the Department of Conservation and Recreation (DCR).

- *Programs have been discontinued,* like the Massachusetts Watershed Initiative, which provided direct funding and technical support to watershed groups. DEP no longer carries out regular coastal monitoring, but directs interested parties to monitoring conducted by the Division of Marine Fisheries (DMF), including fish tissue and shellfish tissue analysis.

- *Regional projects with significant impact have been accomplished,* including the Boston Harbor cleanup. In 1996, the cleanup effort was launched with the completion of the Deer Island treatment plant. At the time of the 2003 CCMP update, the Massachusetts Water Resources

Authority (MWRA) had commenced monitoring at the 9-mile outfall originating at the plant. Since that time, dam removals have opened miles of rivers to anadromous fish, with runs monitored by scores of volunteers.

- *Impacts of climate change are evident,*[1] with new invasive species, changes in fisheries distribution (Figure I-1), increased intensity of storms, and more frequent flooding events.

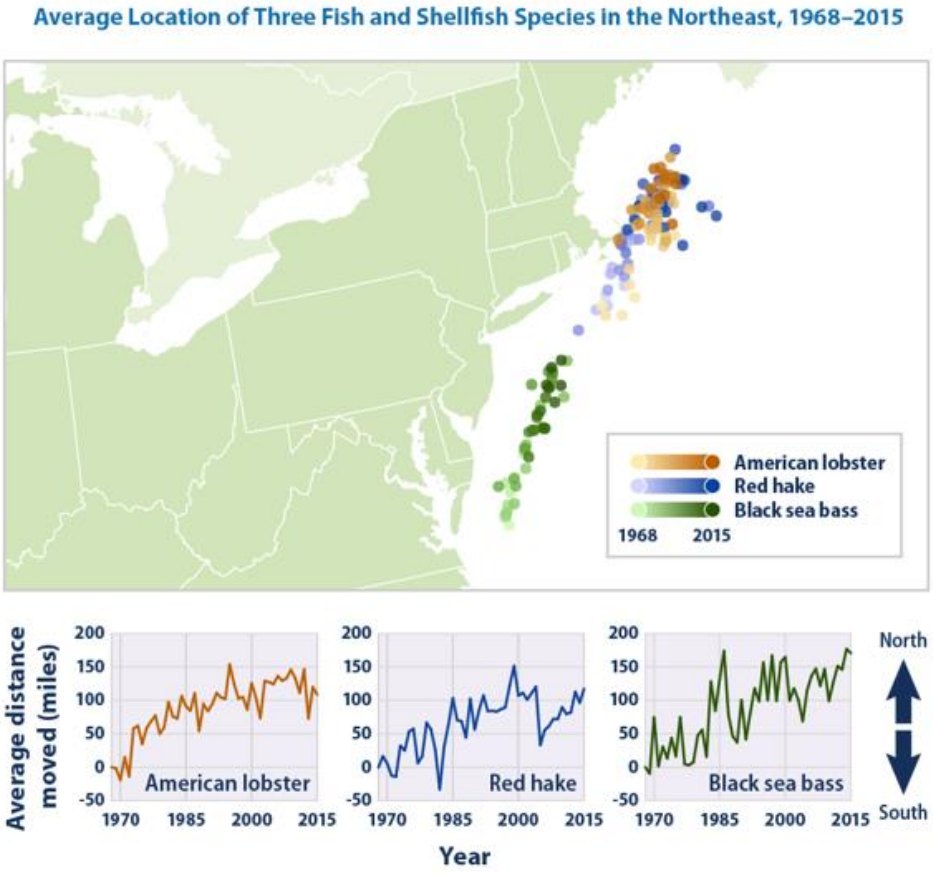

Figure I-1. In waters off the northeastern United States, several economically important species have shifted northward since the late 1960s. The three species shown in the figure below (American lobster, red hake, and black sea bass) have moved northward by an average of 119 miles.[1]

- The *2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan* assesses risk posed by natural hazards, and the economic losses associated with that risk (Figure I-2, for example).[2] A new website, resilientma.org, provides information about multiple impacts of climate change on Massachusetts' communities, natural resources, and infrastructure. Even

[1] EPA. 2016. *Climate Change Indicators in the United States: A Closer Look: Marine Species Distribution*. [https://19january2017snapshot.epa.gov/climate-indicators/climate-change-indicators-marine-species-distribution_.html]
[2] AECOM. 2018. Massachusetts Hazard Mitigation and Climate Adaptation Plan. (https://www.mass.gov/files/documents/2018/10/26/SHMCAP-September2018-Full-Plan-web.pdf)

prior to this documentation, coastal communities acknowledged the need to adapt to climate change, as evidenced by consistent applications for funding and technical assistance. Between 2014 and 2018, the Office of Coastal Zone Management's (CZM's) Coastal Resilience Grant Program, and the Executive Office of Energy and Environmental Affairs' (EEA's) Municipal Vulnerability Program distributed nearly $20million to coastal communities.

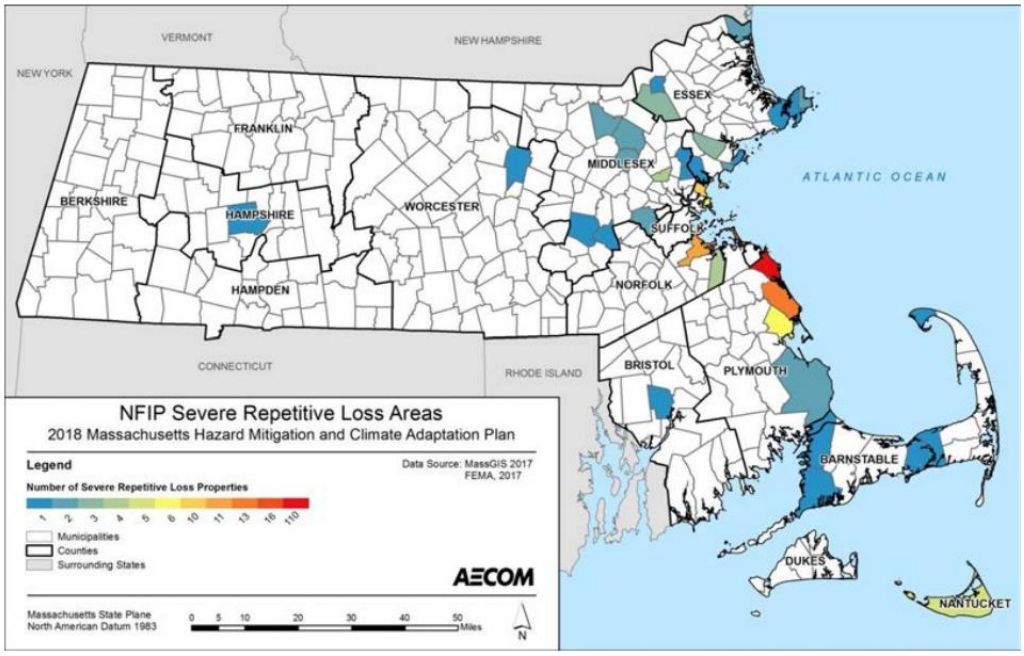

Figure I-2. Severe repetitive property loss due to storms in Massachusetts occur primarily in MassBays' planning area.[2]

- *Funding for environmental agencies has declined.* In FY2003, investment in environmental protection was 0.75 percent of the state budget.[3] In FY2018, environmental spending made up only 0.54 percent of the state budget.[4] The Department of Environmental Protection, a significant partner in MassBays' work to assess and improve water quality, has 37 percent fewer full-time employees in 2016 compared to 2003.[3,5] MassBays received state operating funds in the early years, however that funding was suspended between 2004 and 2008, and discontinued altogether after 2009. Section 320 funding, on the other hand, has increased compared to the period between 1996 and 2007 (Figure I-3).

- *MassBays' influence on local decision making has increased* by virtue of 15 years' effort on the part of the Regional Service Providers (RSPs)and Regional Coordinators (RCs). With funding from MassBays, they have, for example, partnered with municipal staff and officials to

[3] Green Budget FY2015 (https://www.environmentalleague.org/wp-content/uploads/2017/01/FINAL-FY15-Green-Budget-2.14.pdf)
[4] Green Budget FY2019 (https://www.environmentalleague.org/wp-content/uploads/2018/02/FINAL-Green-Budget-2019.pdf)
[5] Abel, David. 2017. *Mass. is enforcing its environmental rules less.* Boston Globe, March 9, 2017. (https://www.bostonglobe.com/metro/2017/03/08/amid-cuts-steep-drop-enforcement-environmental-rules/YYgddkmijr5PC4U7WBmS0H/story.html)

update wetlands and stormwater bylaws, engaged residents in coastal habitat protection and restoration, and secured funding for coastal resiliency measures.

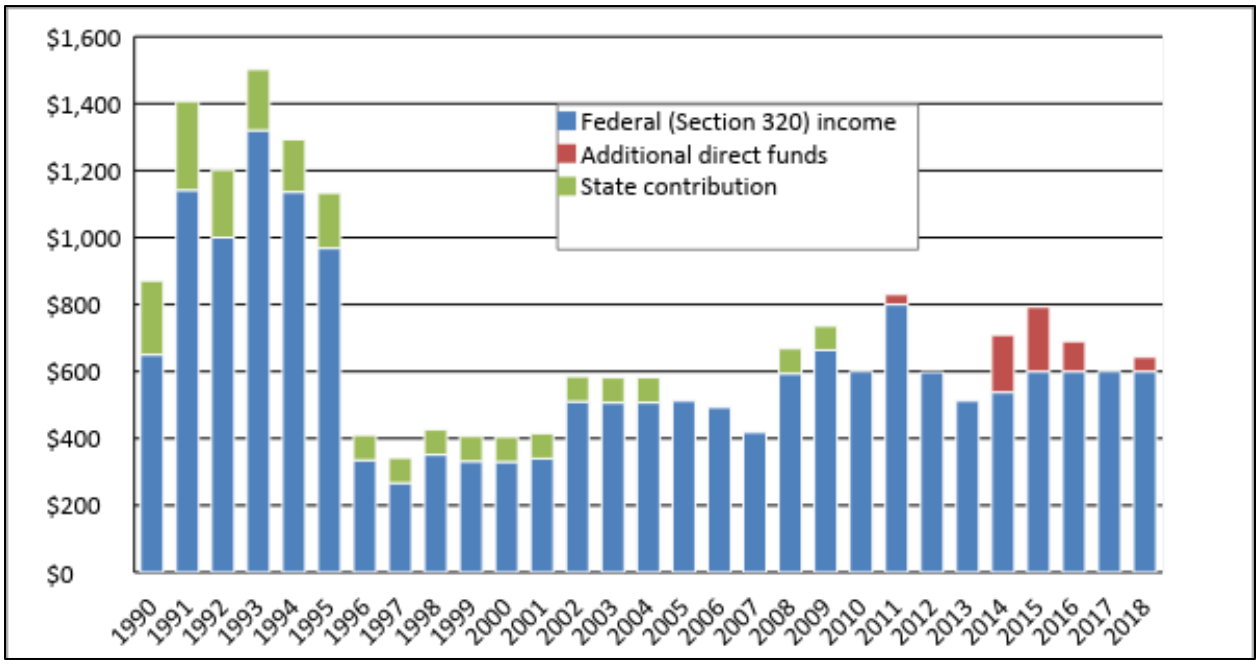

Figure I-3. MassBays funding history, 1990-2018

I.ii. Previous Comprehensive Plans

MassBays' comprehensive plans – the 1996 original CCMP, an update to that completed in 2003, and strategic planning that followed – have each addressed the needs of its time, at the scale needed to address current issues in the Bays. This section describes the scope of those documents and their primary goals.

1996: The First CCMP

MassBays' first CCMP, published in 1996, was the result of 6 years' effort and approximately $6million investment. It featured 15 Action Plans containing 72 specific recommended Actions for preventing pollution, preserving habitat, and restoring degraded resources. Responsibility for those Actions was laid at the feet of local and state agencies; expected outcomes included new policies and programs to be implemented by state and local decisionmakers. At the time of the first CCMP, a number of major construction projects ("Projects of Regional Scope and Impact") were underway or proposed that would have significantly influenced conditions in the Bays, and MassBays positioned itself to ensure that they would be "held to the highest standards of public review."

2003 Update

In 1998, "realizing that it routinely monitors the progress of each Action Plan… staff and Management Committee members agreed that the staff should focus on the five Action Plans that contained the majority of 'urgent' Action Items."[6] Five years later, an update to the CCMP generated 2 more Action Plans (Table I-1) and 17 additional Action Items, expanding the plan's scope to a

[6] Massachusetts Bays Program, 2003. An Evolving Plan for Action: Revisions to the CCMP. p. 9.

total of 88 individual Action Items (Appendix B). That 2003 CCMP update recommended a web-based tracking system to measure progress on the Action Plans which was not realized. For the current CCMP, MassBays staff and partners have documented progress under these categories; Appendix C provides a summary of accomplishments through 2017.

Table I-1. MassBays' 1996 and 2003 CCMP Action Plan Topics

Action Plan	Topic
1	Protecting Public Health
2	Protecting and Enhancing Shellfish Resources
3	Protecting and Enhancing Coastal Habitat
4	Reducing and Preventing Stormwater Pollution
5	Reducing and Preventing Toxic Pollution
6	Reducing and Preventing Oil Pollution
7	Managing Municipal Wastewater
8	Managing Boat Wastes and Marine Pollution
9	Managing Dredging and Dredged Materials Disposal
10	Reducing Marine Debris and Marine Floatables
11	Protecting Nitrogen Sensitive Embayments
12	Enhancing Public Access and the Working Waterfront
13	Planning for a Shifting Shoreline
14	Managing Local Land Use and Growth (expanded in 2003)
15	Enhancing Public Education and Participation
16	Preventing Marine Invasive Species (new in 2003)
17	Monitoring the Marine Environment (new in 2003)

2005-2008, 2009-2014 Strategic Plans

MassBays' struggle to gain ground relative to the broad mandate of the 2003 CCMP is evident in the program's effort to develop more focused strategic plans between 2005 and 2014. Efforts to track progress on CCMP actions had been all but abandoned by this time. Instead, two documents (dated 2005-2008 and 2009-2014) identified activities, subsets of the longer list of actions called for in the CCMP, as priorities for specific lengths of time. The strategic plans were described as the "second level" of planning, between the "first-level" CCMP and the annual workplans at the "third layer:"

> At the second level, this Strategic Plan gives program direction, addressing and reflecting the strengths and limitations of staff and partners in terms of realistic capacity for implementation…
> The annual Work Plan is the third layer of planning, which identifies the timeframes, responsible parties, and specific steps for MBP staff and Regional Service Providers to complete program actions within each fiscal year. Its development is guided heavily by the programmatic intentions articulated in the Strategic Plan.[7]

The 2005-2008 plan focused on "two major areas: producing significant environmental results in the MBP region and building organizational sustainability."[8] Appendix D is a progress report on the tasks laid out in 2005-2008 Strategic Plan, documented in 2009 as Boston staff prepared the 2009-2014 plan.

The 2009-2014 Strategic Plan described its purpose as setting out "program direction, addressing and reflecting the strengths and limitations of staff and partners in terms of realistic capacity for implementation."[9] It was a concerted effort to develop goals both within and across the regions, to support a cohesive story of MassBays' efforts and accomplishments that also acknowledged the differing challenges in each. A significant accomplishment during this time was an Estuarine Delineation and Assessment (EDA), described in Section III, compiling GIS-linked data for parameters available across the MassBays planning, and delineating the landward and seaward boundaries for 47 estuarine watersheds. The EDA establishes a baseline from which MassBays can track changes in the condition of the estuaries over time, and the foundation of the new CCMP.

I.iii. New Issues

Responding to new situations, MassBays' Management Committee worked from 2013 to 2018 to revise our programmatic and organizational goals, and identify strategic actions needed to reach those goals. The Committee determined that a Revised CCMP is needed to reflect changes in MassBays' focus from large pollution-oriented projects to embayment-specific restoration efforts, and to address two significant challenges not previously included in MassBays' CCMP: climate change and environmental justice.

A shift in focus

MassBays' early focus was dominated by large, pollution-oriented challenges, called "megaprojects" in the 1996 CCMP. They included the Boston Harbor cleanup, the Central Artery/Tunnel project, and South Essex and Plymouth sewage treatment projects. All of these projects were completed in the intervening years, and MassBays is now shifting its focus to facilitate action at the local level – which requires site-specific information about the impacts of climate change, water quality, and ecosystem conditions.

[7] Massachusetts Bays Program Strategic Plan, July 2009 – June 2014
[8] Massachusetts Bays Program Strategic Plan, July 2005 – July 2008
[9] Massachusetts Bays Program Strategic Plan, July 2009 – June 2014

Climate change

A vulnerability assessment conducted for the EPA Region 1 NEPs[10] predicts the following for Massachusetts:

1. High risk by 2050 of impacts on habitat and fish, wildlife, and plants due to increased drought and storminess, sea level rise, warmer summers and winters, and warmer water.

2. High risk by 2100 of impacts on recreation and public water supplies, due to increased storminess, sea level rise, warmer summers and winters, and warmer water temperatures.

3. High risk by 2050 of impacts on pollution control, due to increased storminess, warmer winters, and warmer water; by 2100 sea level rise and increasing drought will also contribute to high risk of impacts on pollution control.

These risks translate directly to impacts on MassBays' Programmatic Goals, for example:

- Sea level rise will increase marsh subsidence and other coastal habitat changes. Efforts to protect and restore these shoreline habitats need to take those longer-term impacts into account.

- Warmer water and warmer seasons are expected to change species distribution and abundance, especially with regard to northward migration of aquatic species. Responses to invasive species will need to be evaluated from the perspective of the ability of native species to persist in a new climate.

- Increased and more severe storms will increase impact of stormwater on water quality, change freshwater/saltwater interfaces, and stress existing stormwater and tidal infrastructure (including culverts and tide gates). MassBays must be positioned to help municipalities respond to these impacts in ways that do not accelerate loss of habitat or increase coastal erosion.

These and other programmatic responses to climate change are described in detail with each goal in Section V.

[10] Battelle. 2016. *Climate Change Vulnerabilities Scoping Report: Risks to Clean Water Act Goals in Northeast Sub-regions.* Prepared under EPA Contract No. EP-C-14-017, Work Assignment 1-14.

Likelihood of Occurrence		Low	Medium	High
	High		1. Increasing Drought - Base flow in streams may decrease 2. Increasing Drought - Groundwater tables may drop 3. Increasing Drought - Stream water may become warmer 4 .Increasing Storminess - Stronger storms may cause more intense flooding and runoff 5. Increasing Storminess - The number of storms reaching an intensity that causes problems may increase 6. Warmer Winters - Less snow, more rain may change the runoff/infiltration balance; base flow in streams may change	1. Increasing Storminess - Coastal overwash or island breaching may occur 2. Sea Level Rise - Ability of tidal marsh elevation to match rate of Sea Level Rise 3. Sea Level Rise - Ability of tidal marsh to migrate landward 4. Sea Level Rise - Higher salinity may kill targeted species 5. Sea Level Rise - Shoreline erosion may lead to loss of beaches, wetlands and salt marshes 6. Warmer Water - Warmer water may promote invasive species or disease
	Medium	1. Increasing Storminess - Increased intensity of precipitation may yield less infiltration 2. Warmer Summers - Greater electricity demand may affect operation decisions at hydropower dams 3. Warmer Summers - Switching between surface and groundwater sources for public water supplies may affect the integrity of water bodies 4. Warmer Winters - Marshes and beaches may erode from loss of protecting ice 5. Warmer Winters - Rivers may no longer freeze; a spring thaw would be obsolete	1. Increasing Storminess - Turbidity of surface waters may increase 2. Warmer Summers - Higher temperatures may lead to greater evaporation and lower groundwater tables 3. Warmer Water - Desired fish may no longer be present 4. Warmer Water - Warmer Water may lead to greater likelihood of stratification	1. Increasing Storminess - Stream erosion may lead to high turbidity and greater sedimentation 2. Sea Level Rise - Bulkheads, sea walls and revetments may become more widespread 3. Sea Level Rise - Saline water may move farther upstream and freshwater habitat may become brackish 4. Sea Level Rise - Salinization of non-tidal freshwater coastal marshes 5. Sea Level Rise - Tidal influence may move farther upstream
	Low	1. Increasing Drought - Increased human use of groundwater during drought may reduce stream baseflow 2. Increasing Drought - New water supply reservoirs may affect the integrity of freshwater streams 3. Ocean Acidification - Long term shellfish sustainability may be an open question 4. Warmer Winters - A spring runoff pulse may disappear along with the snow	1. Increasing Storminess - Lower pH for NPS pollution may affect target species 2. Ocean Acidification - Fish may be adversely affected during development stages 3. Sea Level Rise - Light may not penetrate through deeper water	
		Low	Medium	High
		Consequence of Impact		

Figure I-4. Risks associated with habitat in the MassBays planning area by 2050, determined "similar to those in the Northeast Study Area" by Battelle analysts. Green cells have low risk, yellow cells have medium risk, and red cells have high risk.[10]

Environmental justice

In 1994, President Bill Clinton issued Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," directing federal agencies to address environmental injustices in their operations and in communities across the country. Massachusetts Governor Paul Cellucci signed an Environmental Justice Policy for the Commonwealth in 2002 (updated in 2017). MassBays' previous CCMPs, however, do not explicitly call out the inequities underserved communities experience in terms of access to greenspace, resources for responding to climate change, or engagement in policy and management discussions.

> *Environmental justice is based on the principle that all people have a right to be protected from environmental pollution and to live in and enjoy a clean and healthful environment regardless of race, income, national origin or English language proficiency. Environmental justice is the equal protection and meaningful involvement of all people with respect to the development, implementation, and enforcement of energy, climate change, and environmental laws, regulations, and policies and the equitable distribution of energy and environmental benefits.*
>
> *-- Massachusetts 2017 EJ policy*

MassBays has a role to play in implementing initiatives to respond to those needs. EPA's Office of Environmental Justice can provide significant support to MassBays' efforts in advancing environmental justice for residents. The Programmatic Goals detailed in Section V include means for taking up this issue.

Given the lack of attention to either of these issues in the existing CCMP, and the central nature of both to any comprehensive environmental management plan, it is clear that MassBays needs a new CCMP.

> *Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA has this goal for all communities and persons across this nation. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards, and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.*
>
> *-- https://www.epa.gov/environmentaljustice*

I.iv. A New Vision, a New Mission

Vision – Defining the Environmental Outcomes of CCMP Implementation

From its beginnings in 1988, MassBays has been dedicated to protecting, restoring, and enhancing the estuarine resources of Massachusetts and Cape Cod Bays. In Spring 2013 the Management Committee endorsed a Vision and Mission for MassBays that would drive subsequent work to develop goals, strategies, and actions.

MassBays' Vision

We envision a network of healthy and resilient estuaries, sustainable ecosystems that support the life and communities dependent upon them.

MassBays' Vision encompasses the **environmental outcomes** anticipated when the CCMP is fully implemented:

- Improved habitat continuity and hydrology
- Resilient coastal habitat, including implementation of nature-based coastal protection measures
- Restored natural communities
- Improved water quality

Mission – Toward Management Outcomes of CCMP Implementation

Following three years of CCMP planning activities, and recommendations from a strategic communications consultant, MassBays' mission was revised once more.

MassBays' Mission

The Massachusetts Bays National Estuary Program is dedicated to protecting, restoring, and enhancing the estuarine ecosystems of Massachusetts Bay and Cape Cod Bay. We facilitate partnerships to prompt local, state, and federal action and stewardship, by convening stakeholders on the local and regional level, providing scientific basis for management decisions, and working with decisionmakers to identify problems and solutions.

This mission statement serves as a stand-alone, easily shared description of the organization's role relative to the array of groups working on Massachusetts coastal issues, and the work needed to address both environmental and management challenges in the planning area.

I.v. A New CCMP

With the current revision, MassBays' Management Committee proposes an updated approach to improving and protecting the Bays' resources. This new approach:

- Relies on embayment-scale approaches to assessments and solutions.
- Incorporates biological and other indicators of habitat health and measurable outcomes.
- Takes its cues from complementary efforts underway at the local, state, and federal level.
- Acknowledges and incorporates new information about climate change, and realized and predicted impacts.
- Recognizes environmental justice as an underlying requirement for meaningful improvements in the Bays.
- Addresses the need for strategic communication and financial sustainability to increase MassBays' effectiveness.
- Establishes a means for gaining access to and supporting collection of quality-assured data from across the planning area.

The goals, strategies, actions, and implementation timelines articulated in this 2018 CCMP represent MassBays' contribution to and support of a region-wide, multi-jurisdictional effort to improve conditions and monitoring in Ipswich Bay, Massachusetts Bay, and Cape Cod Bay.

Guiding Principles

MassBays' 2018 CCMP documents our organizational and programmatic approaches to improving natural conditions in the Bays. The principles that guide our day-to-day work also guided the development of the CCMP:

Collaboration and Cooperation: The complex and multidimensional issues before us cannot be handled by any single entity. We will work with partners in all sectors, engage underserved communities, and where there is not already an effort underway, and an issue is identified as a priority through our CCMP, we will build capacity locally – providing technical support, grant writing, and regional connections – that get projects done.

Ecosystem-based Management: MassBays seeks fundamental improvement in our estuaries. This requires a holistic approach to problem-solving and decision making. Cross-cutting impacts and implications of any action will be considered before we make significant investments.

Climate Change Resiliency: We know that our estuarine systems will be impacted over the coming decades by the multiple manifestations of climate change. MassBays will draw on the most current understanding of those impacts to evaluate proposed actions.

Long-term Sustainability: As long as the National Estuary Program exists, MassBays will play a role in meeting the goals of CWA §320. Our ability to do this work requires both Management Committee and staff commitment to implementation – and our success in doing so will set the stage for claiming even more success in the future.

Revision Process

This revised CCMP was more than five years in the making (Figure I-5). With the EDA and a comprehensive literature review (see Section III.ii) as scaffolding, the process began with a scoping

exercise with the Management Committee and RCs. The group looked in detail at the actions listed in the 2003 CCMP (Table I-1), and by consensus, decided whether to *Stop*, *Start* (where an action had not already been taken up) or *Continue* each activity. During a subsequent full-day meeting, the Management Committee adopted a mission and vision, then developed overarching goals and strategies to guide outreach and solicitation of input from those interested in our work. From this core group we reached out to an ever-widening circle of stakeholders, gathering additional perspectives on MassBays' organizational and programmatic goals. Methods of engagement included:

- MassBays RCs provided practical insights and connections to communities to ensure that our plan would be practical and valuable to resource managers and decisionmakers.
- Citizen-scientist volunteers, municipal officials, local and regional nonprofits, and federal and state government agencies were polled through a series of regional workshops and an online survey. Outcomes from these meetings are included in Appendix E.
- A social anthropologist conducted one-on-one interviews with individuals who may not have realized that they have a stake in the health of the Bays. His findings are in Appendix F.
- State, federal, and regional planning agency partners joined the MassBays Executive Director for information exchange sessions to identify efforts already underway, and areas where MassBays can augment existing work or fill in gaps. Their contributions are compiled in Appendix G.
- A public review period began with the 2015 State of the Bays Symposium, itself an opportunity for MassBays to connect past trends and existing conditions to future actions.
- Soon after, EPA initiated a reassessment of their own Guidance for CCMP Updates and Revisions. The final version, released May 2016, sent MassBays back to the drawing board to produce new components now required with a revised CCMP. The Management Committee approved a roadmap to a revised CCMP, as negotiated between MassBays staff and EPA Region 1 (see Appendix H), in July 2017.
- MassBays staff began anew to develop a Revised CCMP in March 2018, in accordance with the roadmap. The Management Committee invested numerous hours in the work of three Subcommittees to develop three component plans of the CCMP. They include: Finance, Strategic Communications, and Monitoring Plans, included as Attachments 1, 2, and 3, respectively, to this document. These plans were reviewed and endorsed by the Management Committee in October and November 2018.
- Finally, a second Public Review Draft CCMP, developed in accordance with the 2016 EPA Guidance and informally reviewed by EPA Region 1, was then released to the public for comment in November 2018. MassBays Regional Coordinators convened their Local Governance Committees (LGCs) (the regional equivalent to our own Management Committee) to examine the long-term plan's implications for their own area, especially where local priorities have changed since the 2015 Public Review Draft CCMP was released. Feedback from that outreach is included here as Appendix I. With the close of the comment period, and comments incorporated, MassBays provided a full Revised CCMP to the Management Committee in December 2018 for final endorsement, prior to submission to EPA for approval.

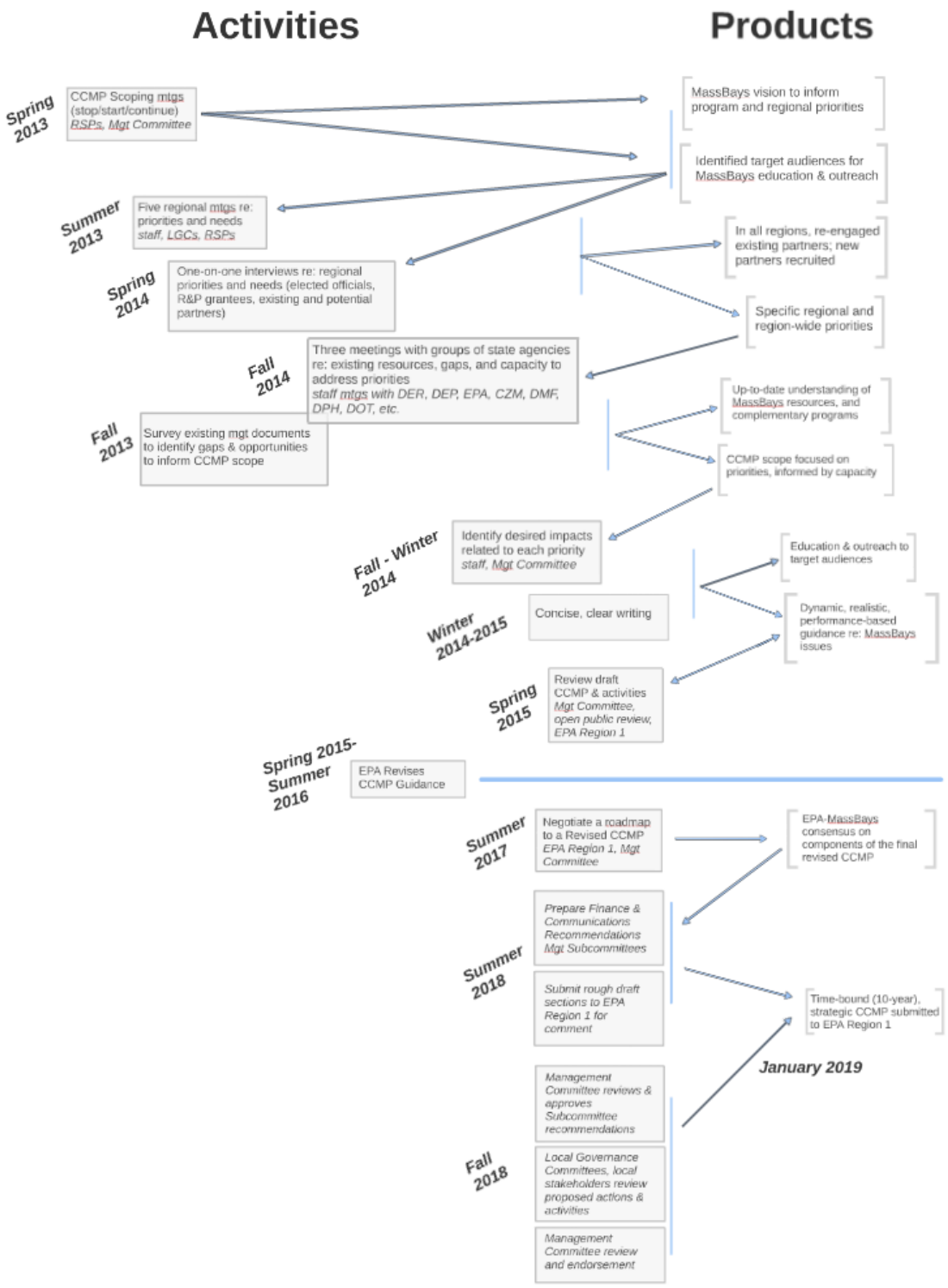

Figure I-5. Activities undertaken, and products delivered, in the course of CCMP development (full process model included as Appendix J).

II. Responding to the Clean Water Act

II.i. The National Estuary Program

Congress established the National Estuary Program under §320 of the CWA in 1987 (legislation reauthorized in 2016), designating nationally significant estuaries threatened by pollution, development, or overuse. Each of the 28 NEPs created under CWA are required to:

1. *assess trends* in water quality, natural resources, and uses of the estuary;
2. *collect, characterize, and assess data* on toxics, nutrients, and natural resources within the estuarine zone to identify the causes of environmental problems;
3. develop the relationship between the in-place loads and point and nonpoint loadings of *pollutants to the estuarine zone and the potential uses* of the zone, water quality, and natural resources;
4. *develop a comprehensive conservation and management plan* that recommends priority corrective actions and compliance schedules addressing point and nonpoint sources of pollution to restore and maintain the chemical, physical, and biological integrity of the estuary, including restoration and maintenance of water quality, a balanced indigenous population of shellfish, fish, and wildlife, and recreational activities in the estuary, and assure that the designated uses of the estuary are protected;
5. develop plans for the *coordinated implementation* of the plan by the States as well as federal and local agencies participating in the conference;
6. *monitor the effectiveness* of actions taken pursuant to the plan… (CWA §320b)

This document responds to CWA §320b(4), and addresses all mandates through that overarching plan.

II.ii. The Massachusetts Bays National Estuary Program

In the 1980's, Boston Harbor was considered one of the filthiest in the nation. A significant cause of the pollution problem was an antiquated sewage treatment facility located on Deer Island, which discharged approximately 138 tons of wastewater solids and sludge just one-half mile offshore into the harbor every day. In 1982, the City of Quincy and EPA filed suit against the Commonwealth of Massachusetts for violations of the Clean Water Act in Boston Harbor, and won.

The Massachusetts Bays Program was launched in 1988 as a result of the settlement payments from this lawsuit. That same year, the program was nominated into the National Estuary Program (NEP) with the support of public officials, environmental organizations, state and federal legislators, business leaders, scientists, and private citizens. On Earth Day in April 1990 EPA announced its favorable decision, and the NEP was formed through a cooperative agreement between the Commonwealth and EPA, with CZM named the host institution. The planning area was defined to include 50 coastal communities and more than 1100 miles of coastline around three Bays: Ipswich, Massachusetts, and Cape Cod (Figure II-1).

In the early years, the Program led a major scientific research initiative to determine specific pollution problems in Boston Harbor. MassBays administered a $1.6million Environmental Trust from payments made by Boston Harbor dischargers. From 1990 to 1992, MassBays distributed more than $1 million of the Trust Fund for research primarily in Boston Harbor and Cape Cod Bay, in an effort to begin characterizing the major physical and biological features of the Bays.

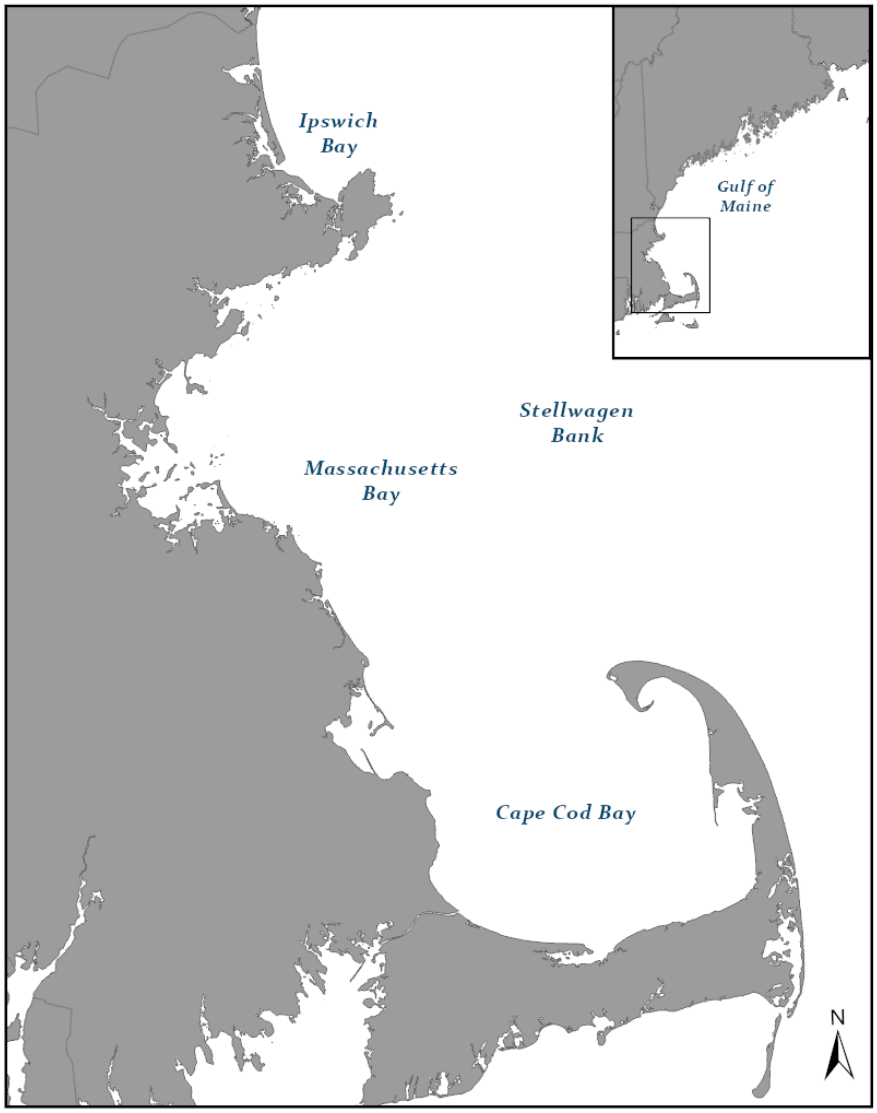

Figure II-1. The Bays

At the same time, a Management Conference was convened to provide a forum for open discussion and collaborative decision-making. The Conference included nearly 300 representatives serving through Committees. Figure II-2 is from the EPA/State Management Conference Agreement dated November 1990 and signed by EPA and Commonwealth officials, included here as Appendix K. In the document summary, the parties to the agreement state:

> The Management Committee has set out a plan to identify priority problems, characterize the Bays, develop management and action plans, and translate plans into actions. The Management Committee recognizes the importance of informing, educating, and involving the public about the pollution in the Massachusetts Bays and how we can all help to improve the Bays' health. At the end of five years, our success will not be measured by how many reports we have produced, but by whether our actions have resulted in reduced pollutant loadings to the Bays and in the formation of a comprehensive

management plan that enjoys a broad-based public commitment to the restoration and preservation of Massachusetts and Cape Cod Bays.[11]

Conference members were organized into a network of committees to oversee Program activities and research. Drawing on the research results, staff led a collaborative process to develop MassBays' first Comprehensive Conservation and Management Plan in 1996. Since then, the CCMP was updated in 2003 with new initiatives and Action Plans, the Management Conference and associated committees evolved into a smaller Management Committee with a broader purview, and in 2013 the Program name was changed to emphasize the organization's basis in the Clean Water Act: Massachusetts Bays *National Estuary* Program.[12]

Committee	Members	Role
Policy	EOEA Secretary EPA Regional Administrator	Sets overall policy
Management	Local, State, and Federal agency representatives TAC representatives CAC representatives	Develops program goals and 5-year plan Approves budgets Awards contracts Approves and accepts reports
Technical Advisory (TAC)	Scientists, planners, state and federal agency staff	Recommends scientific and technical direction Recommends funding of specific projects
Citizens Advisory (CAC)	Representatives from citizen groups, e.g., industry, education, environmental, legislative, advocacy	Recommends priorities for all aspects of program Mobilizes public support Coordinates outreach

Figure II-2. Organization of the MassBays Management Conference, 1990

[11] Massachusetts Bays National Estuary Program. 1990. EPA/State Management Conference Agreement.
[12] Massachusetts also has a second NEP, the Buzzards Bay National Estuary Program (buzzardsbay.org).

With 66 distinct assessment units (embayments, rocky shoreline areas, and barrier beaches) from Salisbury to Provincetown (See Section III), effective stakeholder engagement requires local expertise. Early in its establishment, MassBays created a regional structure which facilitates technical support on a town-by-town basis. This unique structure also maximizes EPA's investment in MassBays, bringing five additional staff to the service of the Bays whereas only two direct hires would be supported by those same funds if expended through the host agency.

Instead, MassBays provides grants to RSPs (Figure II-3), with grant awards based on the following:

- A record of local engagement in their region, including setting priorities for actions that improve coastal habitats and promote habitat protection and restoration.
- Adequate regional visibility and reputation to provide leadership and technical support to local partners.
- Capacity and willingness to leverage additional resources in service of MassBays' mission.

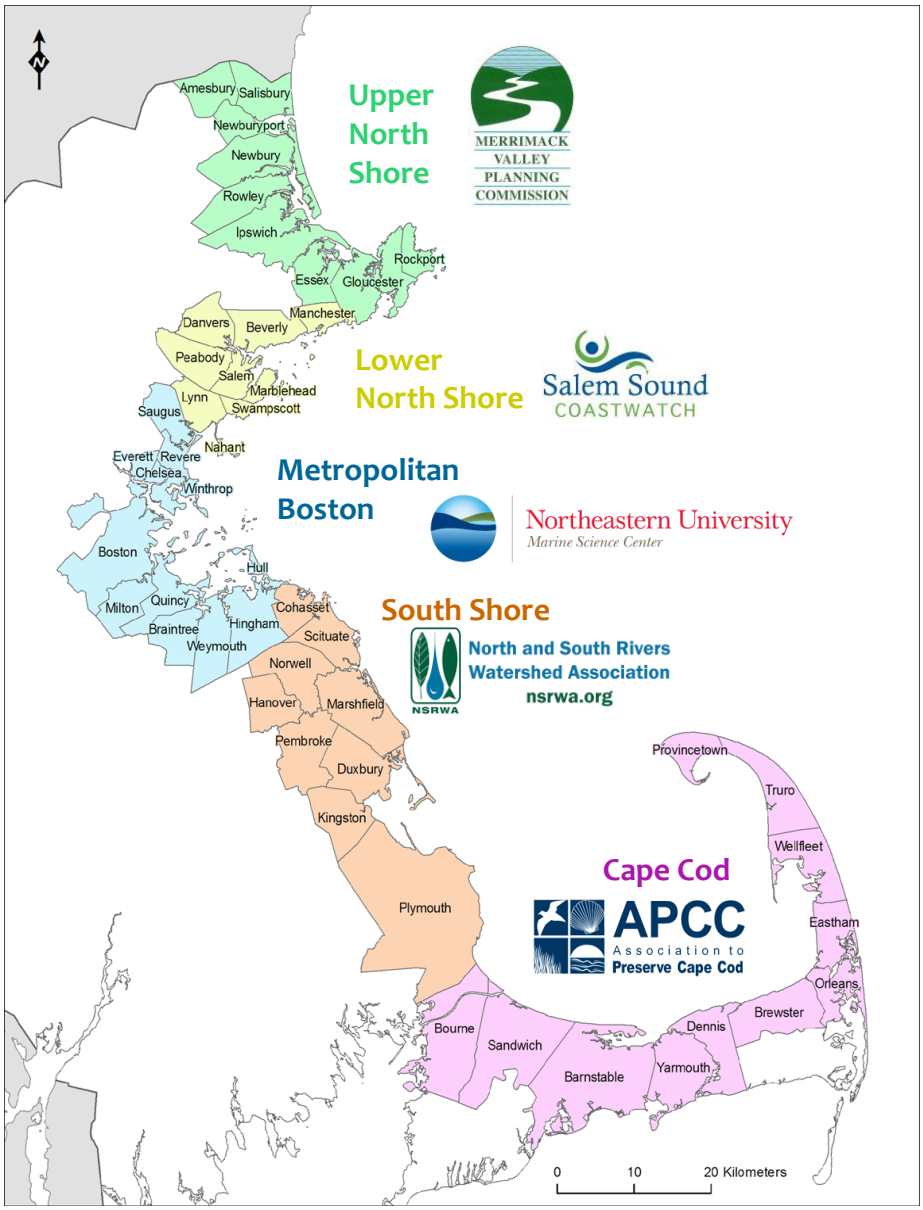

Figure II-3. MassBays Bays, Regions, and 2018 Regional Service Providers

Each RSP employs an RC, who in turn convenes an LGC to set regional priorities and develop workplans aligned with the CCMP.

Figure II-4 is an organizational chart for MassBays which highlights the importance of the Management Committee for oversight and advice to MassBays' work through quarterly meetings and Subcommittee activities dedicated to specific needs. In accordance with our Structure and Operating Procedures (2013, available at www.mass.gov/files/documents/2017/10/06/2013%20MassBays%20SOPs.pdf), members represent:

- Federal and state agencies
- State-wide nonprofit environmental organizations
- Sub-regional nonprofit environmental organizations
- Business community
- Research and/or academic institutions
- Local government

Appendix L lists the Management Committee members in place during the 2013-2018 CCMP revision process.

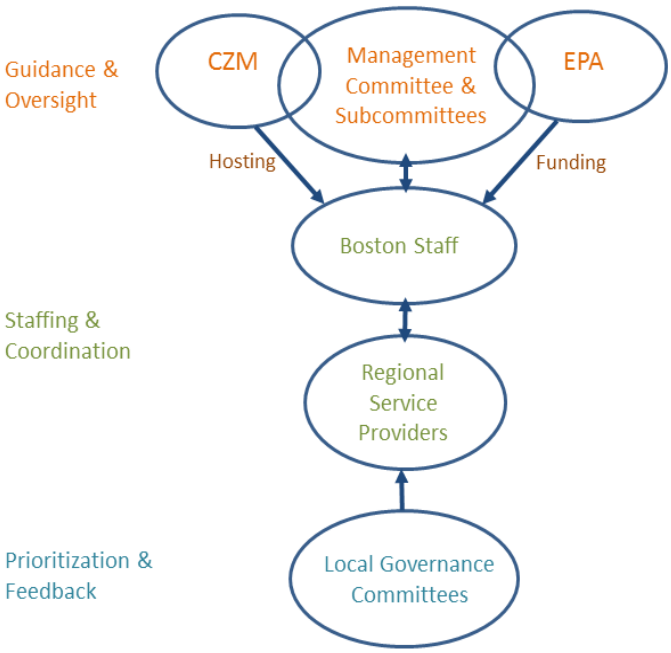

Figure II-4. MassBays organizational chart

III. Data sources

As required under the Clean Water Act, MassBays reports on the condition of the Bays approximately every five years with a State of the Bays report. With conferences and documents, we provide snapshots of estuarine conditions in the MassBays planning area. The scope of that reporting has been limited by the availability of data for such assessments, however, and for the most part available data focus on water quality in Boston Harbor and Cape Cod Bay (relying on data from MWRA), state-wide presence/absence of salt marsh and sea grass (based on DEP mapping), shellfish and fish landings (using DMF statistics), and region-wide land use assessments by CZM.

The Estuary Delineation and Assessment (see Section III.i below) is the first step toward assessing and reporting on localized conditions. EDA 2.0 has identified 69 individual embayments, rocky intertidal areas, and barrier beaches and dunes that will form the basis for future assessments (Figure III-1). Beginning with the 47 embayments, MassBays is setting the stage to provide data and interpretation of those data to individuals and organizations living and working in the Bays. We envision an online, interactive ecohealth report card (developed in association with the University of Maryland) that will allow MassBays to present current information about the Bays, at both a big-picture and at the level of individual embayments.

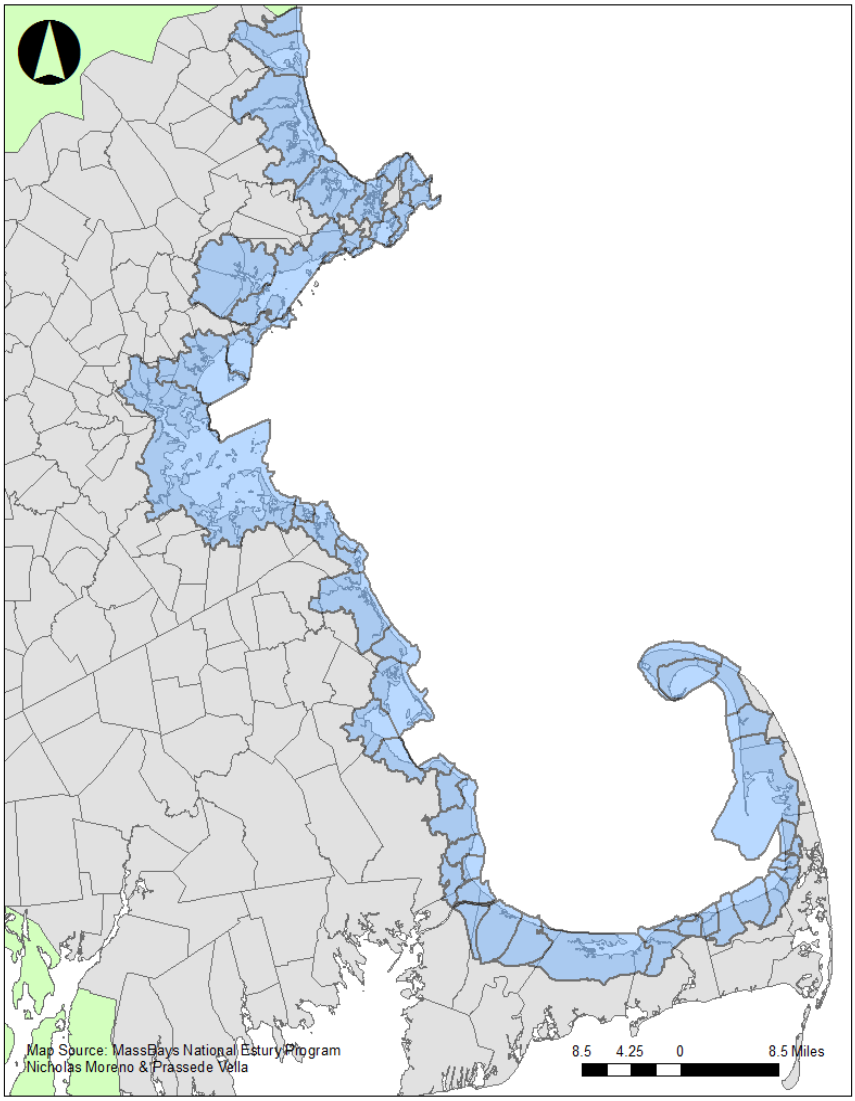

Figure III-1. Assessment Units identified in EDA2.0

In implementing this CCMP, MassBays seeks to bring together existing data and information, as well as identify gaps in knowledge across the reporting. We have already begun the work of compiling information in new formats that facilitate examining the progress and needs in the Bays.

III.i Estuary Delineation and Assessment

MassBays' Estuary Delineation and Assessment (EDA) physically defines the estuarine boundaries of the MassBays planning area and describes important biological features as well as anthropogenic stressors (see Table III-1) of 69 assessment areas. The EDA forms the basis of a tool that uses key metrics – like biodiversity and water quality – to track changes in estuarine conditions over time, ultimately providing more site-specific information for our State of the Bays reports. In the meantime, the data are available via online, interactive maps accessible through an ArcGIS Story Map (launch due March 2019).

Table III-1. EDA 1.0 parameters

Environmental Stressors	Estuarine Resources
High Intensify Land Use	Salt Marsh Extent
Annual Stormwater Discharge	Tidal Flat Extent
Impervious Area	Seagrass Extent
Population Density	Shellfish Habitat
Wastewater	Shorebird Habitat/Nesting Sites
303(d) Impairments	Anadromous Fish Runs
Designated Shellfish Growing Area	Sandy Beaches/Dunes
Impoundments/Fish Passage Barriers	Rocky Intertidal Shoreline
Stream Crossings	
Mooring Fields	**Social**
Marinas	Public Coastal Beaches
Dredge Projects	Beach Quality
Seawalls and Related Structures	Coastal Beach Access

EDA 1.0 (2013) incorporated data sets that were available across all 47 embayments. With EDA 2.1 we began work to try to distinguish among the embayments, to look for distinct characteristics that would allow comparison of conditions among like systems (for example, population density and tidal flushing). Northeastern University conducted statistical analysis that categorized 42 of the 47 estuarine embayments into four types. More ecological, physical and human use metrics will be included as data become available in order to refine the characterization of the assessment areas and help examine the causes of deteriorating conditions to inform management actions.

III.ii MassBays Resource Inventory

In 2013 MassBays commissioned an inventory of planning and assessment documents that address the 47 estuarine embayments within MassBays. The purpose of this inventory was two-fold. First, to gain an understanding of past work, existing plans and assessments in the region, thus avoiding duplication of effort with the CCMP. We also sought to make the results of past work (often available only in hard copy) more accessible. More than 500 completed or in-process reports, plans, and studies dating from 1996 to 2013 were collected and/or scanned, and more than half of these were summarized to inform the revision of the CCMP. The documents are categorized by five topic areas (Water Quality, Estuarine Habitat Protection, Continuity of Estuarine Habitat, Invasive Species, and Climate Change/Vulnerability). MassBays is currently working with partners to explore means for updating and keeping the inventory up-to-date. The documents will be available alongside the EDA data through the March 2019 ArcGIS Story Map (and until then via MassBays' website).

III.iii Massachusetts Ocean Management Plan

The Massachusetts Ocean Management Plan, mandated by the Massachusetts Oceans Act of 2008, directs siting and regulates implementation of ocean activities in Commonwealth waters to protect critical marine habitat and important water-dependent uses. The Plan establishes 12 Special, Sensitive or Unique estuarine and marine life and habitats (SSUs); most relevant to MassBays are the estuarine resources (such as eelgrass beds and tidal flats) and habitats that support endangered and threatened birds and fish. Data characterizing these SSUs are compiled by various agencies and academics, and are shared via a regular 5-year review and update of the Plan. CZM is the lead agency for this effort.

III.iv Northeast Ocean Data Portal

The Northeast Ocean Data Portal is a centralized, peer-reviewed source of data and interactive maps of the ocean ecosystem and human activities in the Northeast (Maine to Long Island Sound). Established in 2009, the Portal provides user-friendly, centralized and free access to data and information to facilitate decision making by agencies, industries, non-governmental organizations, academia, and individuals. Data providers include state and federal agencies, scientists, ocean industries, non-governmental organizations, among others. Datasets relevant to MassBays' work include habitats, marine mammals, turtles, avifauna, water quality conditions, and human uses such as maritime transportation, fishing, and infrastructure. The Portal is managed by the Northeast Regional Ocean Council (NROC).

III.v. Northeast Regional Association for Coastal and Ocean Observing Systems

The Northeast Regional Association for Coastal and Ocean Observing Systems (NERACOOS) is one of ten Integrated Ocean Observing Systems funded by NOAA to support the United States' participation in the International Ocean Observing System. NERACOOS supports a network of offshore buoys from the Canadian Maritimes to the New York Bight, including three in MassBays' planning area. The sensors deployed on these buoys provide weather and oceanographic data which could be useful to MassBays, especially regarding prevailing currents and changing temperatures. More recently, NERACOOS has begun supporting efforts to improve water quality monitoring, predict harmful algal blooms, and forecast coastal flooding and erosion events.

NERACOOS is a nonprofit entity, and has included a New England-based NEP Director on its Board of Directors to facilitate collaboration. MassBays has served on the Board since 2017.

By invitation from NERACOOS, MassBays participated in the development of the Integrated Sentinel Monitoring Network for Change in Northeast U.S. Ocean and Coastal Ecosystems (ISMN), a joint project of NERACOOS and NROC. The Network was established in response to a recognized need for a regional integration of monitoring efforts, the better to observe and interpret changes in the ecosystem.[13] A science and implementation plan for monitoring ecosystem change forms the basis of this work. The Plan identifies a suite of ecosystem indicators, existing monitoring efforts, and gaps for pelagic, benthic, estuarine and nearshore ecosystems. MassBays will be able to utilize the data generated and compiled by the Network for activities in the implementation of the CCMP. In particular, the estuarine ecosystem indicators will be particularly useful to inform on trends and conditions of estuarine and nearshore ecosystem health for MassBays.

III.vi. Boston Harbor Habitat Atlas

MassBays' Metro Boston regional service provider developed an online interactive tool designed as a living resource for people interested in conditions and ongoing research in Boston Harbor and environs. The Boston Harbor Habitat Atlas covers Boston Harbor and Rumney Marsh and includes communities along the coast from Saugus to Hull. The Atlas provides valuable information on the coastal and marine habitats, the species dependent on them, and the ecosystem services they provide. A beta version of the Atlas is currently available through Northeastern University's website.[14] Links to the final version will be provided through the MassBays' website as well.

[13] Runge, J. et al. 2012. *Integrated Sentinel Monitoring for the Northeast Region: Gap Assessment.* Interagency Ocean Observing Committee Community white paper, accessed December 20, 2018 at http://www.neracoos.org/sites/neracoos.org/files/documents/Sentinel/Northeast_Sentinel_Monitoring_IOOC_CommunityWhitePaper_Rung_etal_2012.pdf

[14] Accessed December 20, 2018 at https://www.arcgis.com/apps/MapSeries/index.html?appid=ac43b7f9b74248059725a5dd50a16a82

IV. The MassBays Planning Area

IV.i. Geography, Geomorphology and Hydrology of the Bays

MassBays' planning area encompasses an offshore area of about 1,651 square miles with an inland watershed covering more than 7,000 square miles. From coastal wetlands, it stretches offshore to Stellwagen Bank, a National Marine Sanctuary 25 miles east of Boston, between Cape Ann and Cape Cod. The average depth in the Bays is 30m (maximum 89m on Stellwagen Bank). The 1100-mile coastline from Salisbury to Provincetown is characterized by diverse geomorphology: salt marshes, barrier beaches, estuaries, coastal embayments, and rocky shores.

The Bays form the southern boundary of the Gulf of Maine. The shoreline includes beaches of sand and gravel deposited by glaciers, and intertidal rocky shores with exposed bedrock. The seascape of the Bays is a patchwork of mud, sand, gravel, and boulders (Figure IV-1).[15]

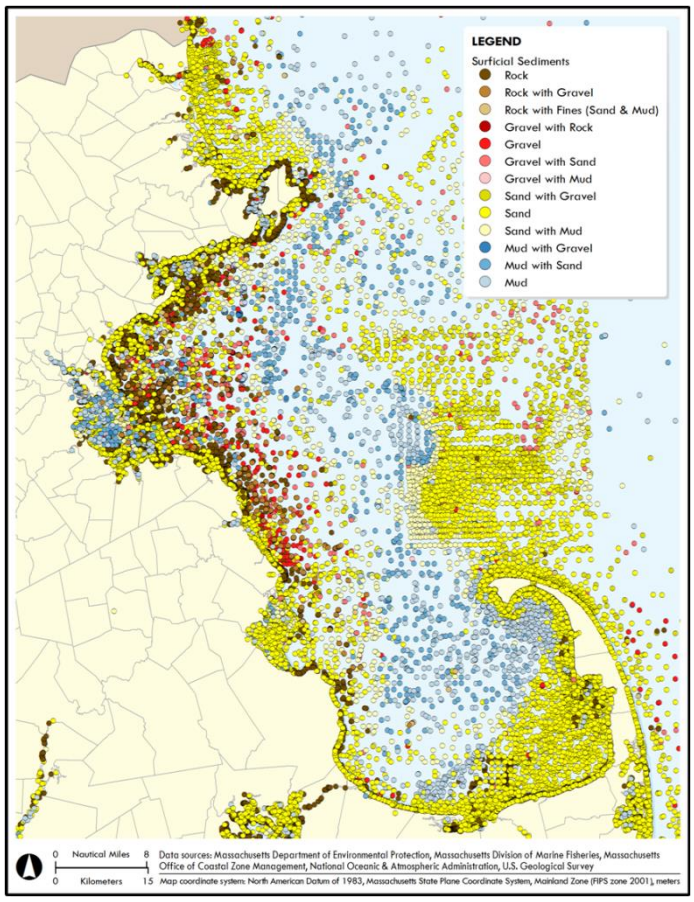

Figure IV-1. Variation of seafloor characteristics in the MassBays offshore planning area

Shoreline habitats in the Bays are determined by geology, slope and orientation, and exposure to waves, as well as adjacent land use and freshwater flow from inland. In general, there is a gradient of habitat from Ipswich Bay, where salt marshes dominate, to the southern coast of Massachusetts Bay where rocky intertidal habitat mingles with marshes, and finally to Cape Cod Bay, which is dominated by sand beaches, dunes, and tidal flats.

The Bays have a tidal range of up to 4.1m (12ft). Changing tides, riverine flow, and winds generate currents which can be substantial in some areas, for example Boston Harbor, around Cape Ann, and at the tip of Cape Cod off Provincetown's Race Point. Tidal water remains in some embayments as long as 45 days, or as short as only a few days, depending on the shape and depth of the area.[16]

[15] Knebel, H., R. Rendings, and M. Bothner. Modern Sedimentary Environments in Boston Harbor, Massachusetts. Journal of Sedimentary Petrology, 61(5): 791-804.
[16] 2015 Massachusetts Ocean Management Plan
https://www.mass.gov/files/documents/2016/08/pp/2015-ocean-plan-v2-complete.pdf

In general, the strength and direction of currents flowing south from the Gulf of Maine vary seasonally, with cold water flowing through Ipswich and Massachusetts Bays south to Cape Cod Bay, and exiting the region around the Provincetown peninsula (Figure IV-2).[17,18] The residence time of Massachusetts Bay varies with the inflow from the Gulf of Maine, and sometimes Massachusetts Bay is somewhat isolated from Cape Cod Bay. This flow is influenced by riverine inputs, especially during spring. Several rivers carry nutrients and pollutants from upland parts of the watershed to coastal wetlands and into Ipswich and Massachusetts Bays[19]. These include the Charles, Mystic, Neponset, Saugus, Parker, Ipswich, Rowley, and Essex rivers. The largest river is the Merrimack River with a 10-year average flow 245 $m^3 s^{-1}$ (8,745 $ft^3 s^{-1}$); spring maximum up to 616 $m^3 s^{-1}$ (22,000 $ft^3 s^{-1}$)[7]. USGS has documented an increase in flow from the Merrimack River since the 1960s, as measured using a federally funded stream gage.[20]

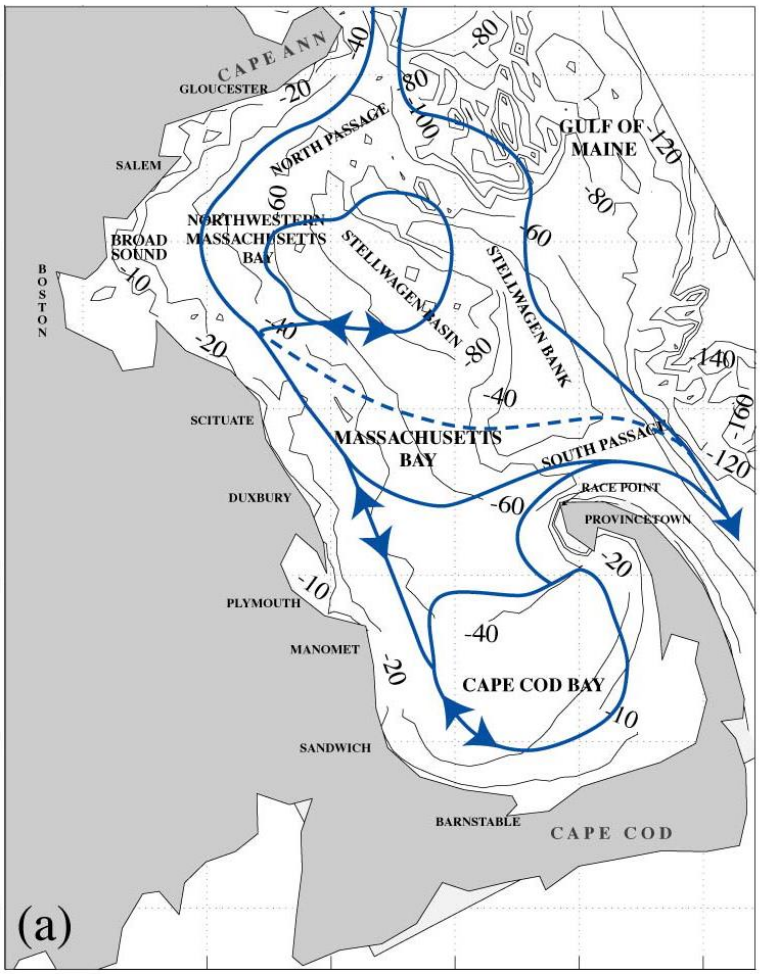

Figure IV-2. Summary of currents and circulation in the Bays. Source: Lermusiaux, PFJ. 2001. Evolving the subspace of the three-dimensional multiscale ocean variability: Massachusetts Bay. J. Marine Systems, Special issue on ``Three-dimensional ocean circulation: Lagrangian measurements and diagnostic analyses'', *(29), 1-4, 385-422.*

Cape Cod Bay is a dynamic environment and has its own hydrologic "regime" that influences observed differences in nutrient cycling and productivity patterns between open coastal waters and shallow embayments. Cape Cod Bay receives most freshwater input from groundwater inflow. Because Cape Cod residents rely primarily on septic systems, the groundwater that seeps into Cape Cod Bay often carries more nutrients into coastal waters than the coastal rivers[8]. Monitoring data suggest an overall decline in environmental conditions nearshore in Cape Cod Bay.

[17] Geyer et al. 1992. Physical Oceanographic Investigation of Massachusetts and Cape Cod Bays. MBP-92-03. Boston, MA.
[18] Waves of Change. The Massachusetts Ocean Management Task Force Report and Recommendations. Commonwealth of Massachusetts. 2004.
[19] 2009 Massachusetts Ocean Management Plan https://www.mass.gov/files/2017-08/v2-text.pdf
[20] USGS Current Water Data for Massachusetts https://waterdata.usgs.gov/ma/nwis/rt (accessed 1/28/2019).

IV.ii. Conditions in the Water Column

Temperature

Sea surface temperature influences many aspects of an organism's life history, including breeding and spawning, migration, predator/prey interaction, and basic physiological functions. Data compiled by NERACOOS show that the temperature of Massachusetts Bays is on a rising trend. Changes in temperature can cause organisms to shift locations where they live and feed, which in turn can impact the ecosystem itself. For example, sea temperatures recorded in 2012 were the warmest in 12 years, causing early molting in American lobster (*Homarus americanus*) in the Gulf of Maine. Scientists predict that the continuing increase in water temperature will make lobster eggs less likely to survive their first year of life, resulting in fewer numbers of lobsters through 2050.[21]

Table III-1 Surface and bottom temperature in Massachusetts Bay (Source: NERACOOS)

	Max temp °F	Min temp °F	Average temp °F
Massachusetts Bay Surface	74.0	34.0	51.4
Massachusetts Bay, 50m depth	56.1	35.4	43.4

Variation in water temperature at different depths creates "layers" in ocean waters. Depending on the temperature, the layers hold oxygen and nutrients differently, impacting microbial growth and concentrations over the course of the year.

Dissolved oxygen

Dissolved oxygen (DO) is an important indicator of water quality. Too little dissolved oxygen impacts fish and other biota, and extreme oxygen depletion can result in fish kills. Warmer water temperatures and higher microbial activity in summer reduce the concentration of dissolved oxygen in lower layers. At the same time, DO levels are typically lower in waters closer to shore compared to off-shore, largely because of nitrogen coming from the land and less layering and opportunity for mixing in shallower waters. In Massachusetts Bay, DO levels are highest in January through March (9-12 mg/L), decrease to 6-8 mg/L in summer through November, and then begin increasing again as the layers mix.[22] In 2017 bottom water DO levels were moderate over most of Massachusetts Bay and would have been lower was in not for an upwelling in June. However, when destratification happens late in the fall as happened in 2017, bottom DO minima in southern Massachusetts Bays and Cape Cod Bay were in the lower range of historic values (though > 6 mg/L).[23]

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[21] Pershing, A. et al. 2015. Slow adaptation in the face of rapid warming leads to collapse of the Gulf of Maine cod fishery. Science V. 350 (6262): 809-812.

[22] Werme, C. and C.D. Hunt. 2006. Outfall monitoring overview. Boston: Massachusetts Water Resources Authority Report 2006-18.

[23] Libby PS, Borkman DG, Geyer WR, Turner JT, Costa AS, Wang J, Codiga D. 2018. 2017 Water column monitoring results. Boston: Massachusetts Water Resources Authority. Report 2018-04. 59 p. http://www.mwra.state.ma.us/harbor/enquad/pdf/2018-04.pdf

Nitrogen

Nitrogen is a limiting nutrient in marine water, so when nitrogen or its compounds are added to coastal waters a burst of microbial growth – phytoplankton or algae blooms – often occur. MWRA's Deer Island Treatment Plant discharges the highest amount of nitrogen into Massachusetts Bay, via diffusers that release wastewater, following secondary treatment, 15.3 km (9.5 miles) offshore. Effluent flow to Massachusetts Bay in 2017 was slightly lower than the 1999-2017 average, about 328 million gallons per day (MGD). The total nitrogen load was just less than 12,000 metric tons (MT) per year which is well under the 14,000 MT per year warning threshold. Between 2001 and 2011 the treatment plant discharged 362 million gallons per day of effluent to Massachusetts Bay with an average total nitrogen concentration of 24 mg/L. In 2017, nutrients in surface waters ranged from 8 µM in February and March, decreasing to <2 µM from April to October due to draw down from phytoplankton blooms. Late winter-spring blooms in 2016 and again in 2017 were dominated by *Skeletonoma* spp., rather than *Phaeocystis*, that could be due to warmer waters in early 2017. Seasonal stratification was more pronounced in June 2017, mainly due to higher rainfall and increase riverine flow resulting in lower salinity and higher nutrient concentrations in the Bay. Higher nitrogen values (4 -10 µM) were detected in from April to October in the bottom waters of Massachusetts Bay. Cape Cod Bay had lower concentrations (2-4 µM).[15]

Microbes

Massachusetts' bacteria-based water quality standards set limits on fecal coliform for shellfish-growing areas and limits on *Enterococcus* for swimming and boating. Coastal water may receive direct discharge of bacteria from wastewater treatment plants or combined sewers (which carry both stormwater and wastewater during heavy rain), storm drains, and illegal discharge from boats, among others. Several wastewater treatment facilities discharge directly to the MassBays planning area. These are required to keep the level of microbes below threshold. Most treatment plants have secondary treatment and therefore discharge contain nitrogen at 10-12 mg/L. A tertiary treatment could potentially bring this down to 2-3 mg/L. The wastewater treatment plant in Gloucester is the only plant with primary treatment but the plant has special monitoring requirements in order to make sure that discharges do not exceed permitted levels (T. Callaghan, pers. comm.)

Algae and phytoplankton

The MassBays planning area experiences annual spring and fall phytoplankton blooms which are measured by concentration of Chlorophyll a (Chl a). MWRA monitoring in Massachusetts Bay[22] indicates that during the March/April bloom (which coincides with freshwater flow from spring rains and snowmelt), Chl a averages just about 2.5 mg/L. Surface concentrations decrease to less than 2 mg/L during the summer, and then spike in September through November to about 4 mg/L (after nutrients are replenished when layers mix, bringing the end to stratification).[24]

[24] Geyer W., G.B. Gardner, W. Brown, J. Irish, B. Butman, T. Loder, and R.P. Signell. 1992. Physical Oceanographic Investigation of Massachusetts and Cape Cod Bays, Technical Report MBP-92-03. Massachusetts Bays Program, U.S. EPA Region I/Massachusetts Coastal Zone Management Office, Boston, Massachusetts.

Phytoplankton blooms have been observed in several areas. MassBays' regional coordinator for the Lower North Shore (Salem Sound Coastwatch) has teamed up with researchers from Salem State University to explore potential causes of these blooms. Data since 2010 and 2012 indicate that these blooms are the cause of observed turbidity in Salem Harbor.[25,26]

Algal growth peaks during June to August. In the last decade or so, however, algal blooms have been observed. These blooms often extend into the months prior to June. Additionally, the species may be nonindigenous and often end up on adjacent beaches through the summer months. Places where this has been observed include Salem Sound where researchers have been trying to understand the causes of these blooms in order to take action.[25,26.]

IV.iii. Living resources and habitat types

Salt marshes

There are approximately 40,000 acres of salt marsh in the MassBays planning area (DEP Wetland data MassGIS year), a slight increase since 2003 (34,000 acres). About 30,000 acres make up Great Marsh which includes marsh, barrier beach, tidal river, estuary, mudflats, and upland islands extending from Salisbury to Gloucester. The Great Marsh (Figure III-2) is an internationally recognized Important Bird Area, supporting many breeding and migratory birds. More than 300 bird species have been recorded within the Great Marsh. Recent studies on the health of the marsh indicate that the ecosystem is currently in good shape; however, there are some significant threats to its ecological health that need to be addressed.[27]

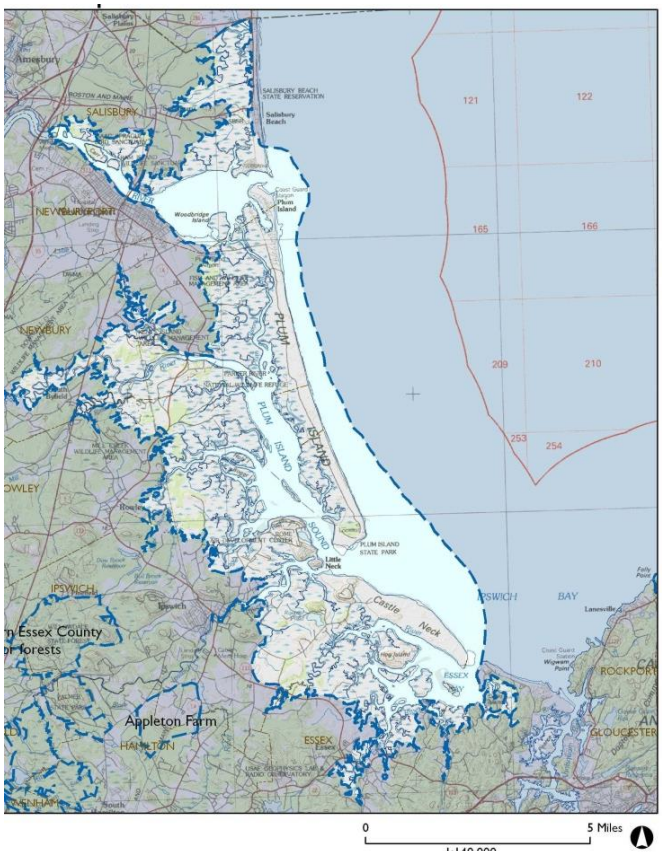


Figure III-2. Map of Great Marsh including the towns of Salisbury, Newburyport, Newbury, Rowley, Ipswich, Gloucester and Essex.

[25] Hubeny, B. et al. 2017. Multi-faceted monitoring of estuarine turbidity and particulate matter provenance: Case study from Salem Harbor, USA. Science of The Total Environment 574:629-641.
[26] Hubeny, B. 2012. Determining the nature and causes of turbidity events in Salem Harbor (MA) through estuarine water quality monitoring. Massachusetts Bays National Estuary Program Grant. Boston, Massachusetts.
[27] Heil, R. & C. Leahy. Accessed 1/25/2019 at https://www.massaudubon.org/our-conservation-work/wildlife-research-conservation/statewide-bird-monitoring/massachusetts-important-bird-areas-iba/iba-sites/great-marsh)

This unique complex of natural systems adds ecological, economic, recreational, and cultural value to the daily lives of both coastal and inland communities where land is connected by river and stream networks. Other large salt marshes are in Scituate/Marshfield and Duxbury Bay on the South Shore, and in Barnstable on Cape Cod. Historically, salt marshes ringed the Boston Harbor region and extended well into the Saugus, Mystic, Charles, and Neponset Rivers.[28] Now only a fraction of those historic marshes remain, namely Rumney Marsh and Belle Isle Marsh. It is estimated that salt marsh loss in the Boston Harbor region is close to 81% since pre-colonial times. This loss is largely due to placement of fill but is also a result of salt marsh ditching and the restriction of adequate tidal inundation (E. Reiner, pers. comm.)..

The importance of salt marshes for coastal resilience

In addition to their role in nutrient cycling, water quality improvement, and providing habitat for the life cycle of various organisms, healthy salt marshes are important for coastal resilience, protecting coastal areas from the potential impacts of climate change and sea level rise. Where they are able to migrate spatially and adapt unimpeded, salt marshes attenuate the adverse impacts associated with storms and sea level rise including increase in coastal flooding, storm surge and waves, and erosion. With increase in sea level, a healthy and resilient salt marsh is more likely to capture sediment and keep pace with rising sea levels. In urban areas salt marsh habitat may be limited and may eventually be lost, taking with it beneficial ecosystem services that are important for the protection and wellbeing of surrounding human communities. Local, state, federal and non-profit organizations are involved in salt marsh conservation and restoration. The goal is to restore the trajectories of salt marsh building forces so that this important habitat can sustain itself and maintain a high degree of integrity over time (U.S. Fish

While the Massachusetts Wetlands Protection Act was enacted in 1972 (and incorporates the Rivers Protection Act of 1996), development, pollution, changes in hydrology (including activities for mosquito control), invasive species, and climate change still threaten salt marshes. When natural flushing by tides is restricted by road crossings or tide gates, salt marsh grasses are displaced by invasive species like *Phragmites australis* or purple loosestrife (*Lythrum salicaria).*

Sea level rise and the impacts of development adjacent to marshes present challenges to the health of the Bays' salt marshes. Over the past decades several efforts were underway to restore salt marsh in various locations through removal of tidal restrictions and other activities to restore the hydrological conditions that support this habitat. Managers and scientists are assessing opportunities and capacity for salt marshes to migrate inland, and remain a vital feature of the coast (Figure III-3). As awareness of the ecological and economic value that salt marshes provide to surrounding communities increases, more protection and restoration opportunities are being identified and implemented across the MassBays planning area. With the increasing threat of sea level rise, coastal communities are increasingly taking into account salt marsh condition in vulnerability assessments and mitigation plans, seeking to restore this important habitat to coastal ecosystems.

[28] Carlisle, B.K., et al. 2005. 100 Years of Estuarine Marsh Trends in Massachusetts (1893 to 1995): Boston Harbor, Cape Cod, Nantucket, Martha's Vineyard, and the Elizabeth Islands. Massachusetts Office of Coastal Zone Management, Boston, MA; U.S. Fish and Wildlife Service, Hadley, MA; and University of Massachusetts, Amherst, MA. Cooperative Report. Accessed 11/20/18 at https://www.mass.gov/files/documents/2016/08/or/ma-estuarine-trends.pdf

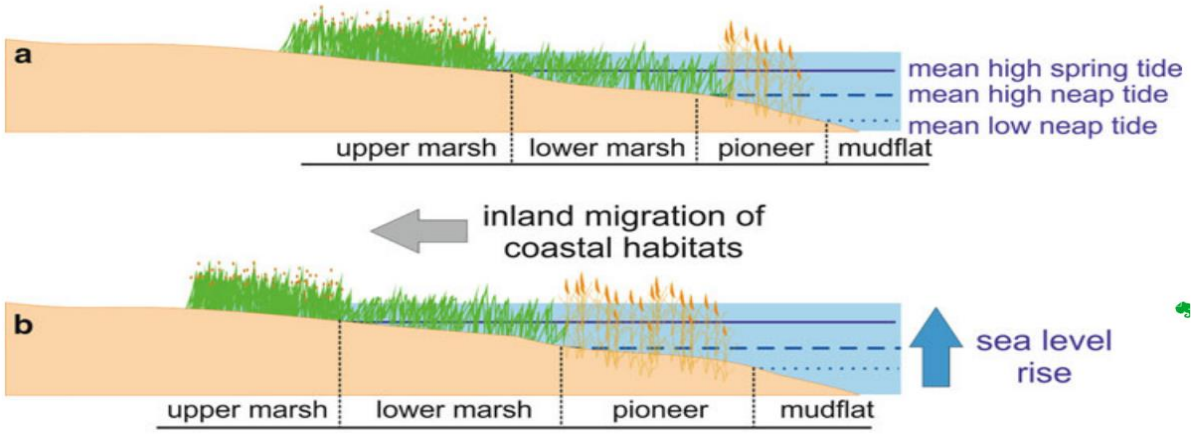


Figure III-3. Current salt marsh extent (a) and with sea level rise (b). The latter (b) depicts migration of upper- and lower-marsh plants inland as the tide reaches further upslope. Image Source: Luciana S. Esteves, 2015. Coastal Squeeze In: M.J. Kennish (ed.), Encyclopedia of Estuaries, Dordrecht: Springer Science+Business Media, DOI 10.1007/978-94-017-8801-4

Tidal flats

There are roughly 28,000 acres of tidal flats in MassBays. About 40% are located along Cape Cod Bay and constitute the largest flats in North America, extending 9.7 miles along the shore from Brewster to North Eastham.[29] Duxbury and Plymouth Bays on the South Shore, and Ipswich Bay on the North Shore, also contain extensive tidal flats.[30]

Vulnerability of tidal flats to climate change

Intertidal flats help mitigate impacts from storm damage; more specifically, the gradual slope of these areas helps to slow the advances of floodwaters and attenuate the impacts of waves. Like salt marshes, coastal dunes, barrier beaches, and other coastal habitats, tidal flats are protected by the Wetlands Protection Act as "likely to be significant to storm damage prevention and flood control." However, coastal infrastructure such as seawalls, wharves and jetties often contribute to erosion of tidal flats. Climate change impacts include erosion which is affecting tidal flats and the beaches behind them, in particular in areas such as Skaket Beach in Orleans and Breakwater Beach and Paine's Creek in Brewster. Skaket Beach has been losing 3-4 inches/year and up to five feet in certain areas from erosion.[27]

Tidal flats are relatively level and sparsely vegetated areas of loose sand and mud that are exposed at low tide and submerged at high tide. These flats, which provide a critical link between the terrestrial and marine systems, are typically found in areas sheltered from wave action where fine-

[29] Setterlund, C. 2016. "The Changing Shape of the Cape & Islands: The tidal flats of Brewster, Orleans, & Eastham." *Cape Cod Life*, September/October accessed 12/20/2018 at https://capecodlife.com/the-changing-shape-of-the-cape-islands-the-tidal-flats-of-brewster-orleans-eastham/

[30] Hankin, A. L. et al. 1985. Barrier Bleachers, Salt Marshes, and Tidal Flats. An Inventory of the Coastal Resources of the Commonwealth of Massachusetts. CZM publication 13899-27-600-1-85 C.R.

grained sediments settle. Conditions in intertidal flats are variable given the unconsolidated nature of the sediment, changes in temperature, and presence or absence of water related to tides. Despite the variability, or maybe because of it, tidal flats support a high degree of biodiversity. As tides rise to cover the flats, juvenile fish often swim in from nearby shallow subtidal zone to feed. High densities of commercially important crustaceans and shellfish thrive in sheltered tidal flats, creating an excellent foraging ground for migrating and wading shorebirds, including threatened and endangered species such as the piping plover and roseate tern. Like salt marshes, coastal dunes, barrier beaches, and other coastal habitats, tidal flats are protected by the Wetlands Protection Act as "likely to be significant to storm damage prevention and flood control." Yet erosion poses an important threat to tidal flats and the beaches behind them. Sea level rise also poses a threat to tidal flats from complete submergence, putting organisms they support at risk.[31]

Seagrass communities

Seagrass communities inhabit the intertidal and shallow subtidal coastal zones. Within the MassBays planning area, the exposed shoreline tends to restrict eelgrass (*Zostera marina*) to protected harbors and inlets, sheltered from storms and waves. Because it supports commercially important species of fish and other nekton, seagrass has been studied extensively and there is a wealth of information about this habitat. However, there are major data gaps mainly tied to the spatial fluctuations in location and extent from year to year that have not yet been fully explained. Major threats to eelgrass come from wastewater and stormwater discharge causing turbidity and eutrophication, and from physical damage and increase in turbidity caused by certain fishing gear, moorings, dredging, aquaculture, and boating activities. Eelgrass is also vulnerable to population fluctuations resulting from intense coastal storms, wasting disease, epifauna and impacts from invasive species including green crabs.

Several efforts are underway to monitor the extent of eelgrass in Massachusetts, as scientists, managers, and decisionmakers strive to understand its natural spatial variability, and are looking for ways to keep track of changing conditions (Figures IV-4 and IV-5). DEP initiated the Eelgrass Mapping Project in 1995, the most comprehensive eelgrass survey effort in the state. The project involved mapping embayments across the state with a combination of aerial photography, digital imagery, and ground truth verification. Findings of the first 12 years of the project are documented in Costello and Kenworthy[32] revealing increased eelgrass coverage in only three embayments and documenting an overall loss of 1,865 acres of eelgrass. More recently, additional data were collected by DEP in 2015/2016 (analysis in progress).

Regular and frequent eelgrass monitoring across Massachusetts is challenging, due to the methodologies used and the resources required. As such, it is difficult to estimate total eelgrass extent across the state. Since 2011 DMF has conducted acoustic mapping of eelgrass beds in select

[31] Galbraith et al. 2005. Global Climate Change and Sea Level Rise: Potential Losses of Intertidal Habitat for Shorebird. USDA Forest Service Gen. Tech. Rep. PSW-GTR-191. 2005.
[32] Costello, C. and W.J. Kenworthy (2011) Twelve-year mapping and change analysis of eelgrass (Zostera marina) areal abundance in Massachusetts (USA) identifies statewide declines. Estuaries and Coasts 34(2):232-242. DOI 10.1007/s12237-010-9371-5.

embayments, compiling detailed information on changes in aerial extent of eelgrass beds over time, in particular where eelgrass restoration has taken place.

These efforts produce important data but cannot be conducted as frequently as desired due to limited funding and staff availability. In 2017, with funding from EPA, MassBays and DMF developed a rapid assessment protocol to monitor eelgrass to be implemented by trained citizen scientist. The protocol was successfully piloted in 2018 in Duxbury-Kingston-Plymouth bays (DKP) where significant loss of eelgrass has been documented since 1995. The goal is to repeat the monitoring every year in DKP and to eventually engage citizen science groups to implement the protocol in other embayments.

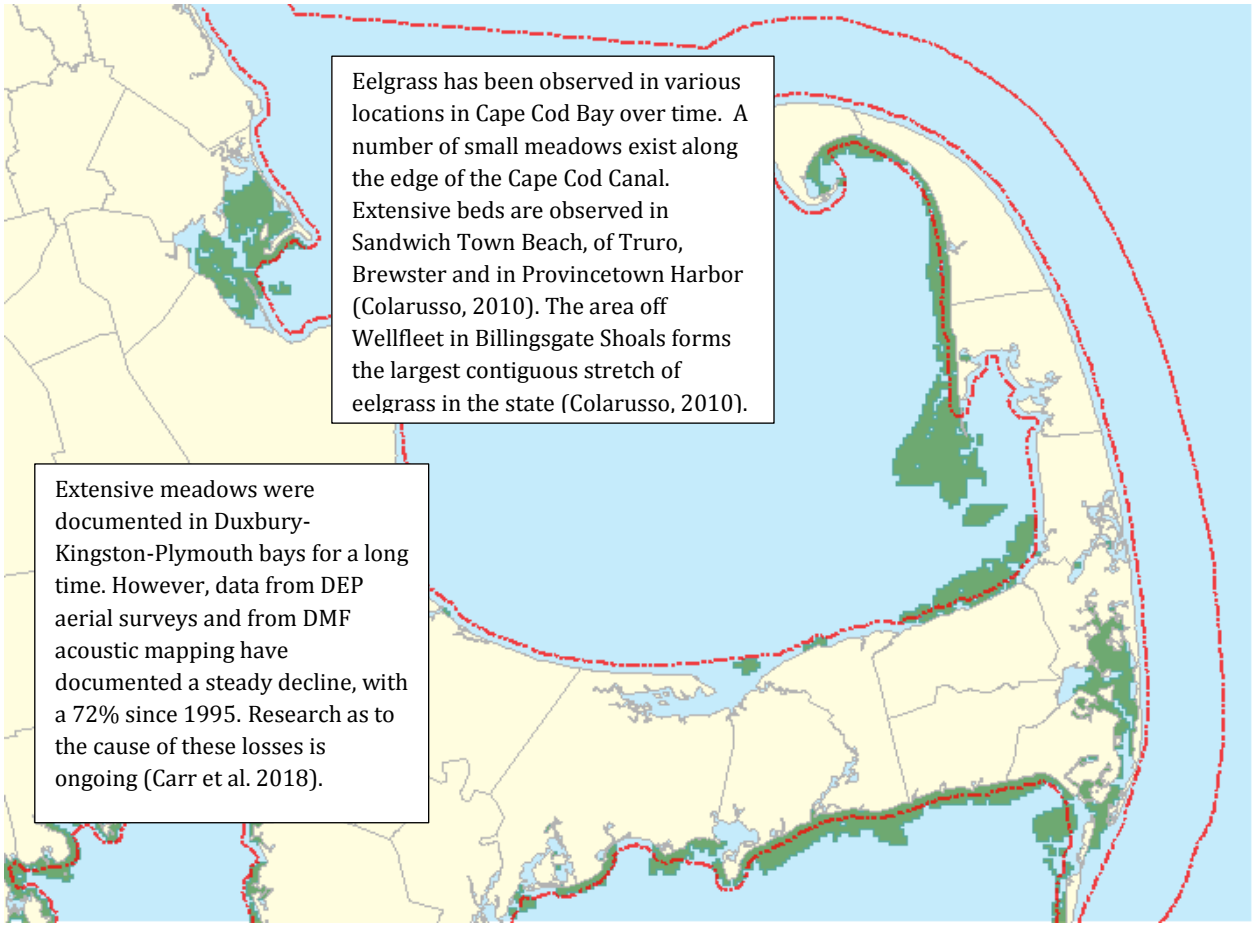


Figure IV-4. Eelgrass distribution in the South Shore and Cape Cod regions as of 2017, including details of observed changes in eelgrass extent in sample embayments over the past several decades.

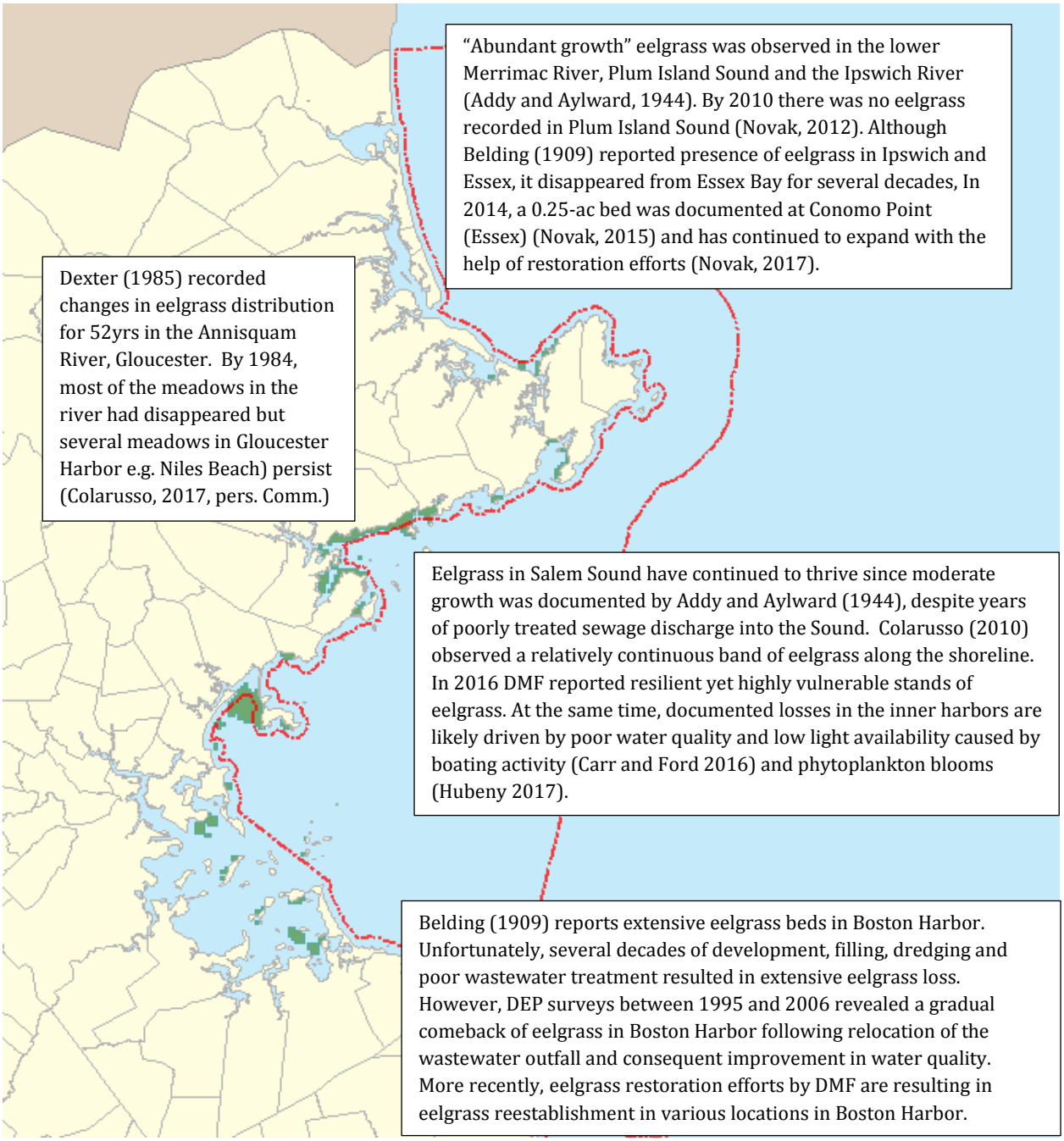


Figure IV-5. Eelgrass distribution in the North Shore and Boston regions as of 2017, including details of observed changes in eelgrass extent in sample embayments over the past several decades.

Rocky shores, barrier beaches and coastal dunes

Rocky intertidal shorelines are prevalent in the North Shore region extending from Nahant through Cape Ann. Several rocky shorelines are also found around areas of Salem Sound and around Boston Harbor. There are approximately 105 acres of rocky intertidal habitat in the Boston Harbor area, both natural and manmade (DEP Wetland Layer MassGIS). Most of the natural rocky intertidal shorelines occur on the Boston Harbor Islands, with a total of almost 800 acres of rocky intertidal area across the planning area.[33] Rocky intertidal habitats support organisms that are uniquely adapted to relatively harsh environments including exposure to wave action and exposure to dry conditions and predators at low tides. Examples include mussels, limpets, snails and some species of algae.

Rocky intertidal shorelines contribute to coastal resilience as they help stabilize shorelines against erosion. Rocky intertidal shorelines provide haul-out areas for seals and feeding grounds for foraging birds. Because they are well flushed by wave action, rocky intertidal shores tend to be less affected by pollutants than other coastal habitats. Nonetheless even rocky shores can be degraded by severe pollution; in particular, oil spills constitute a potential threat. On the other hand, sea level rise may cause shifting in zones and associated organisms. Warming waters may also cause changes in the species component that dominate this habitat and replacing native communities by invasive species including sea squirts and green crab. Rocky shorelines are primarily vulnerable to human development which has often resulted in degradation through development of shoreline protection structures such as seawalls, jetties and riprap. Rocky shorelines are therefore protected by regulating proximal development under the Massachusetts Wetlands Protection Act.

Shoreline change in Massachusetts

A 2013 study conducted by USGS and CZM examined rates of shoreline change along the Massachusetts coast. The goal of the projects is to develop and distribute scientific data that will support local land used decisionmaking. The 2013 study reported that the highest long-term erosion rate, over the span of 150 years, averaged to -1.5 m y^{-1} at Lovells Island in Boston Harbor. Short-term erosion was experienced in tidal flats in Quincy Bay at a rate of -7.7 m y^{-1} from 1994 to 2008. With climate change, greater rates of erosion are expected to occur along with the predicted increase in intensity and frequency of storms. Since the 2013 study, CZM has developed an online interactive viewer of changes in shoreline extent over the years, available at https://www.mass.gov/service-details/massachusetts-shoreline-change-project.

Barrier beaches are popular for recreational uses, and are sought-after locations for residential and commercial development. MassBays' planning area includes more than 100 miles of beach, [32] primarily in the Upper North Shore along Plum Island Sound, along Duxbury Bay on the South Shore, and along most of Eastern Cape Cod Bay. Barrier beaches are dynamic shorelines that constantly change by the forces of wind and wave action. At the same time, barrier beaches act as protective barriers to areas behind them from waves generated by powerful storms. Barrier

[33] Geosyntec Consultants, LLC. Estuary Delineation and Assessment 2.0. Prepared for Massachusetts Bays National Estuary Program. 2017. 26pp.+app.

beaches offer important foraging, nesting and staging habitats for various bird species such as the Piping Plover.

The 13,000 acres of dunes and sandy beaches in MassBays' planning area[34] are vulnerable to impacts of climate change and construction/development. Both structures are in themselves dynamic and vulnerable to erosion and accretion episodes, construction of engineered structures such as groins and jetties is often seen as a solution to protect eroding beaches and the land and communities behind it. However, appropriate design and maintenance of these structures is important so it does not cause more damage to the beach morphology. A 2013 study conducted by the United States Geological Survey (USGS) and CZM examined rates of shoreline change along the Massachusetts coast (see box).

The *Guidelines for Barrier Beach Management in Massachusetts*[35] prescribes best management practices for a broad range of barrier beach activities and interests. For example, beach nourishment (depositing sand dredged offshore onto the beach) is regarded as a coastal resilience action that can protect against the impacts of climate change. In Massachusetts, beach nourishment conducted by the state can only occur on public beaches, or beaches made accessible to the public. Some management practices carried out on sandy beaches can impact their value as a habitat. For example, beach raking is conducted to remove wrack and larger cobble stones – along with the insects and small shellfish that live in the damp detritus. This practice reduces the amount of food available to resident and migrating shorebirds.

Waterfowl habitat

The beaches, marshes, estuaries, rocky outcrops, and islands along the Massachusetts coastline provide valuable habitat for the foraging and reproduction of native and migratory bird species. In fact, 16 species of protected birds use coastal habitats in Massachusetts for at least part of their life cycle. Significant numbers of federally listed species, including Roseate and Least Terns and Piping Plovers, nest on beaches and small islands within Massachusetts coastal areas. There has been an effort to identify and conserve areas that provide habitat of significance to avifauna in Massachusetts. The Important Bird Area Program is coordinated by Mass Audubon to identify and conserve areas that provide habitat of significance to avifauna in Massachusetts. The program lists 28 coastal sites in Massachusetts as IBAs for their value as feeding, nesting, and migration locations. The MassBays planning area includes key shorebird stopover sites, mainly the Parker River National Wildlife Refuge and the Great Marsh Important Bird Area (IBA) on the North Shore, and Duxbury and Plymouth Bay IBA on the South Shore.

[34] Geosyntec Consultants, LLC. Estuary Delineation and Assessment 2.0. Prepared for Massachusetts Bays National Estuary Program. 2017. 26pp.+app.

[35] Massachusetts Barrier Beach Task Force. 1994. *Guidelines for Barrier Beach Management in Massachusetts.* Accessed 12/27/18 at https://www.mass.gov/files/documents/2016/08/vh/barrier-beach-guidelines.pdf

Several species of migrant shorebirds are common in coastal Massachusetts during spring migration, the most numerous include Piping Plover, American Oystercatcher, and Willet.[36] The Piping Plover is a threatened species and a significant proportion of the population breeds in Massachusetts. During autumn migration, Lesser Yellowlegs, Whimbrel, Hudsonian Godwit, and Semipalmated and White-rumped Sandpipers are observed.[37]

The estuarine embayments and ponds within the MassBays planning area are regularly visited by waterfowl during the spring and fall migration, and a few also support foraging and nesting habitat for resident species. From late summer through fall, Gadwall, American Widgeon, American Black Duck, Mallard, Northern Shoveler, Northern Pintail, and Green-winged Teal, migrate through the planning area, while mid- to late fall brings huge numbers of coastally migrating eiders, scoters, and Long-tailed Ducks.[36,38]

Fish runs and spawning areas

Numerous coastal and offshore fish species spend at least part of their lives in estuaries. These habitats are important nursery areas to several economically-important species e.g. winter flounder. Many migrate further upstream. Migratory fish habitat includes areas that support nurseries, feeding, migration and spawning grounds for diadromous fish. Ecosystem services provided by fish runs include recreation and commercial fishing as well as the flushing of nutrients and pollutants discharged up in the watershed.

Bringing river herring back to Massachusetts rivers

Amid rising concerns about the declining numbers of river herring in our rivers and estuaries, DMF establish a moratorium on the harvest of river herring in January 2006. This moratorium, together with tireless efforts by organizations and municipalities to restore fish passage in various waterways, is gradually reaping results. Dam replacement and creation of fish passage in Mystic River in 2012 provided access to 200 acres of spawning and nursery habitat for river herring and American eel. Volunteer visual counts by the Mystic River Watershed Association has documented a threefold increase in herring run to the Mystic Lakes from <200,000 fish in 2012 to a high of approximately 630,000 in 2017 (source: https://mysticriver.org/herring-monitoring).

Diadromous fish runs provide forage for to a wide range of fish and wildlife and were important for traditional small-scale fisheries in coastal towns. There are 48 towns in Massachusetts with a total of more than 100 river herring runs and over 150 fishways.[39] DMF is responsible for the management of diadromous fish populations, and the restoration, improvement, and maintenance of migratory pathways in coastal rivers. For this work, manages collaborative work on large-scale

[36] Callaghan, T., K. Ford and P. Vella. 2009. Massachusetts Ocean Management Plan. Volume 2: Baseline Assessment and Science Framework. Commonwealth of Massachusetts.
[37] USFWS, 2011. Birding in the United Stats: A Demographic and Economic Analysis. Addendum to the 2001 National Survey of Fishing, Hunting and Wildlife-Associated Recreation Report 2011-1.
[38] Callaghan, T., K. Ford and P. Vella. 2015. Massachusetts Ocean Management Plan. Volume 2: Baseline Assessment and Science Framework. Commonwealth of Massachusetts.
[39] Chase, B. 2017. Diadromous Fish Management Update. Presentation at the River Herring Network Meeting, November 2, 2017. Accessed 11/20/18 at http://riverherringnetwork.com/about-us/annual-meeting.html

fish passage and small-scale fish ladder, habitat improvements, and eel ramp construction projects. DMF issues Fishway Construction Permits, operation and maintenance plans, and diadromous fish stream maintenance plans.

The resilience of smelt: Assessing smelt spawning habitat in Saugus River

The area around Boston Harbor is one of the few regions where a viable rainbow smelt fishery still exists. Much of the decline in populations is attributed to restricted access to spawning areas caused by dams and other physical impediments. In 2012, however, more than 3,000 m^2 of viable smelt spawning habitat were documented in Saugus River and its tributaries, representing 34% more than identified in 1998-1990. Construction of a berm adjacent to a restored turning basis has protected the riffle habitat that, together with cobble bottom, is so important for smelt spawning. Over several years, key spawning sites in have been destroyed by siltation, excessive growth of algae, and other forms of pollution. One example is Shute Brook, a tributary of Saugus River. Researchers were so surprised to find thousands of viable smelt habitat in spite of extensive construction and degradation over the years, that they dubbed the area as "the nursery" due to the thousands of eggs observed, thanks to riffles, cobbles and trees providing shade.
(www.mass.gov/service-details/assessment-of-smelt-spawning-habitat-in-the-saugus-river)

Unfortunately, diadromous fish populations and associated habitat have diminished over the past centuries throughout southern New England, in some areas more than others. Dams, habitat alterations, pollution, and overfishing have led to declines in migratory fish numbers. Species such as American shad (*Alosa sapidissima*), alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), striped bass (*Morone saxatilis*), and rainbow smelt (*Osmerus mordax*) were all declining in southern New England by 1870.[40] Although volunteer counts are indicating a slow comeback of river herring into several of MassBays' waterways, stock assessments lack sufficient data to detect discernable trends in over half of the rivers assessed. Of the remainder, 16 showed increasing abundance, two decreasing abundance, and eight were stable. In spite of this, managers are still reluctant to declare recovery of the fishery due to low abundance relative to historic levels, and the uncertain role of various stressors on the different river herring population.

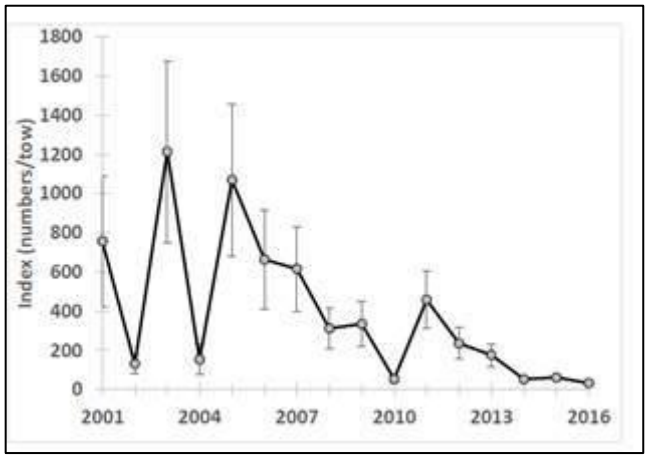


Figure III-5. GLM-standardized index of abundance for YOY American eels, Jones River, MA, 2001–2016.[40]

American eel (see Figure III_5) is the only catadromous species in North America. Small-scale, commercial eel fisheries occur in Massachusetts and Rhode Island and are

[40] Reback, K. E., and J. S. Dicarlo. 1972. Completion report anadromous fish project. *Mass. Div. Mar. Fish. Publ.* 6496, 113 p.

mainly conducted in coastal rivers and embayments with pots during May through November. The first benchmark stock assessment (2012) was updated in 2017 using YOY (Young of Year) indices. Data for Massachusetts were obtained from the only YOY index station in New England, located on Jones River, Kingston. Consistent with the 2012 assessment, it was concluded that the status of the stock was depleted based on trend analyses and commercial landings. [41]

Shellfish beds

Shellfish habitat is found across all MassBays with hotspots on the south shore and around Cape Cod Bay. The Massachusetts coast is characterized by quahogs (*Mercenaria mercenaria*), soft shell clams (*Mya arenaria*), blue mussels (*Mytilus edulis*), razor clams (*Ensis directus*), oysters (*Crassostrea virginica*), and bay scallops (*Argopecten irradians*). Areas within MassBays with vulnerable shellfish resources include: Cape Cod Bay (ocean quahogs and sea scallops), and the North Shore (sea scallops). Shellfish beds are threatened by pollution from land, harmful algal blooms, and construction, among others.

Shellfish areas are classified as open, closed, or conditionally open for harvest by DMF depending on water quality and rainfall.[42] Stormwater remediation is contributing to opening of shellfish beds for harvesting. For example, with funding partially provided by MassBays, the Town of Kingston designed and installed stormwater BMPs – improved water quality resulted DMF reopening 313 acres of viable shellfish habitat in Kingston Bay in 2013.[43] Communities must ensure that the water quality conditions required are maintained in order to keep shellfish beds open. The north shore is also striving to assess and improve water quality conditions in order to reopen previously lucrative beds. To this end, towns around Salem Sound, led by MassBays' Lower North Shore regional coordinator (Salem Sound Coastwatch), is working with DMF to monitor water quality and implement water quality remediation to reopen shellfish beds in these embayments.

Shellfish beds also being developed to grow shellfish as part of nutrient reduction especially in Cape Cod where the prevalence of septic systems has contributed to nutrient enrichment. Although there is no statewide resource assessment for shellfish, shellfish suitability maps were updated in 2009 to illustrate areas of known or anticipated shellfish resource. Some of the regions with shellfish resources that could be considered more vulnerable, or at greater risk of impact Cape Cod Bay (ocean quahogs and sea scallops), and the North Shore (sea scallops). As with other resources, the risk of impact is highly dependent on the proposed use.

Endangered species

While MassBays does not directly addressed endangered species, our work to protect and preserve coastal habitat, and respond to invasive species, will by extension protect the vertebrates, invertebrates, and plants identified through the Federal Endangered Species Act. Massachusetts'

[41] ASFMC Stock Assessment Overview: American Eel 2017 https://www.asmfc.org/uploads/file/59e8c077AmericanEelStockAssessmentOverview_Oct2017.pdf
[42] DMF. "Shellfish classification areas," accessed 11/20/18 at: https://www.mass.gov/service-details/shellfish-classification-areas
[43] Ford, K. and Carr, J. 2016. Eelgrass loss over time in Duxbury, Kingston, and Plymouth Bays, Massachusetts. Division of Marine Fisheries. Accessed 11/20/18 at https://www.mass.gov/files/2017-08/2015%20DuxburyKingstonPlymouth%20Eelgrass.pdf

Natural Heritage and Endangered Species Program has identified the following federally listed endangered and threatened species in MassBays' planning area:[44]

- Atlantic sturgeon
- Loggerhead, green, hawksbill, Kemp's Ridley, and leatherback sea turtles
- Sperm, fin, sei, blue, humpback, and North Atlantic right whales
- Plymouth (Northern) red-bellied cooter
- Piping plover
- Roseate tern
- Northeastern Beach Tiger Beetle
- Sandplain Gerardia (figwort)

[44] NHESP. 2017. The Massachusetts Endangered Species Act List. Accessed 1/24/19 at https://www.mass.gov/service-details/list-of-endangered-threatened-and-special-concern-species

V. A Blueprint for the Bays

A CCMP must be both aspirational and reality-based. Building on a newly articulated Vision and Mission, and recognizing the challenges in the MassBays planning area, the Management Committee has taken the lead in setting out goals, and identifying the strategies we will employ to meet those goals over the next 10 years.

V.i. Challenges

Why does MassBays exist? Why should anyone care if MassBays carries out its mission? The Management Committee, with input from the RCs and LGCs, identified two primary categories of challenges impeding progress toward our vision, Environmental and Management.

Environmental Challenges

The environmental issues identified by stakeholders across all regions of MassBays' planning area can be described quite succinctly as "Coastal habitat degradation and loss of biodiversity characterized by altered hydrology, impaired water quality, vulnerability to climate change, invasive species, and fragmentation." Specific examples of these issues include:

- Dams and stream crossings, tide gates, and water withdrawals often result in **altered hydrology** that adversely impacts coastal habitat, impeding anadromous fish passage, changing natural inundation cycles of salt marshes, and reducing in-stream flow that otherwise supports benthic communities and habitat. This challenge was highlighted by multiple partners seeking healthier marshes for coastal resilience and expanded habitat for anadromous fish.

- **Impaired water quality** is tracked primarily through ongoing and periodic monitoring of nutrient concentrations, temperature, and dissolved oxygen and biological oxygen demand, and is the result of contaminated stormwater inputs and inadequately treated wastewater discharges. Poor water quality can be exacerbated by changes in hydrology and climate. As described in Section III, water quality in the Bays has varied over time, though historical data are available for only a subset of the planning area. With improved water quality, MassBays expects increased biodiversity and restored habitat for shellfish and eelgrass especially.

- A new and significant challenge for MassBays is region-wide **vulnerability to climate change**. Evidence of sea level rise, increased water temperatures, and increased severity and frequency of storms have been documented in Massachusetts. The Commonwealth has invested significant funding and expertise into determining vulnerability of highway and transit infrastructure,[45] examining options for protecting Boston Harbor economic assets,[46] and supporting municipalities in vulnerability assessments and adaptation (e.g., through the

[45] Massachusetts Department of Transportation (MassDOT) Statewide Climate Change Adaptation Plan, https://www.mass.gov/massdot-statewide-climate-change-adaptation-plan

[46] Sustainable Solutions Lab/University of Massachusetts Boston. 2018. *Feasibility of Harbor-wide Barrier Systems: Preliminary Analysis for Boston Harbor*. Accessed 12/17/18 at https://www.umb.edu/editor_uploads/images/centers_institutes/sustainable_solutions_lab/umb_rpt_BosHarbor_5.18_15-optimized.pdf

Municipal Vulnerability Program and the Coastal Resiliency Grant Program). The 2018 National Climate Assessment documents evidence that the Northeastern U.S. is seeing more rapid ocean warming and higher sea level rise than other portions of the world.[47] The "new normal" for the Massachusetts coast – significantly higher high tides, new invasive species, and flashier stream flows – presents a challenge for natural systems and coastal species, as well as organizations focused on conservation of existing ecosystems. By supporting adaptive measures at the local and regional level, MassBays will play a role in maintaining coastal habitats into the future.

- **Invasive species** can be considered a symptom of the stressors above – marine invasives from warmer waters are appearing more frequently due to climate change, for example[48] – invasives like pepperweed and green crabs pose a specific challenge in themselves, threatening biodiversity and destroying habitat for endemic species. MassBays has chosen to address this threat by documenting their presence and undertaking eradication efforts where feasible. These efforts help to sustain diverse ecosystems, making them more resilient in the face of natural and human impacts.

- Development across the MassBays planning area has facilitated **fragmentation** of coastal wildlife corridors and ecosystems, which in turn undermines natural systems' ability to support biodiversity or serve effectively as habitat. MassBays works to document both the variety of mammals, invertebrates, and birds that live in the coastal zone, and the geographic extent and condition of habitats that support them. This information, when communicated to decisionmakers, can prompt planning and environmentally sensitive development that preserves coastal ecosystems.

Management Challenges

Parallel to these environmental challenges, and in many cases, standing in the way of addressing those challenges effectively, is a suite of management challenges recognized by MassBays as barriers to realizing our vision. The Management Committee, RCs, and LGCs identified three primary challenges to be considered and countered in implementing the CCMP:

- **Limited cross-agency and cross-discipline communication and collaboration.** MassBays' focus on convening and coordination has resulted in excellent results with regard to collaboration among the "usual suspects." In many cases, MassBays is the only entity willing or able to convene the myriad stakeholders and their interests for constructive discussion, planning, and action. The challenge continues to exist, however, because cross-discipline and cross-agency collaboration are more difficult than traditional approaches, in which academia, municipal staff, and state-level decisionmakers are able to remain in their silos, often only talking to their own colleagues when brought to the table. This isolation of ideas thwarts generation of creative solutions to environmental challenges.

[47] U.S. Climate Change Research Program. 2018. Fourth National Climate Assessment. Accessed 12/27/18 at https://www.globalchange.gov/nca4

[48] Office of Coastal Zone Management, Rapid Assessment Surveys of Marine Invasive Species, https://www.mass.gov/service-details/rapid-assessment-surveys-of-marine-invasive-species

- **Inconsistent public engagement, especially from underserved communities** is another management challenge that prevents realization of MassBays' vision. Landowners must see the value in restoring hydrologic systems, residents must take responsibility for their own impacts on water quality, taxpayers must be willing to support climate adaptation measures that protect their neighbors as well as their own properties, and the impacts of invasive species and fragmentation on longer-term health of coastal systems must come into the realm of public awareness. MassBays' efforts to address this challenge will include demystifying decision making processes and providing access to staff responsible for decision making at the federal, state, and local level. Only with investment and buy-in from land- and home-owners, taxpayers, and residents of all stripes will we see wholesale changes in how municipalities respond to the environmental challenges of coastal habitat degradation and loss of biodiversity.

- **Lack of information to support decision making** prevents forward momentum in responding to multiple environmental challenges. Investment in environmental monitoring has fallen off since MassBays' early years, when millions were made available for baseline assessments in Boston Harbor. While MWRA continues to support monitoring in Cape Cod Bay and the lower reaches of the Mystic, Neponset, and Charles Rivers, their scope is still confined to Boston Harbor and the 9-mile outfall.[49] Localized data are critical to local planning that takes natural resources into account, and MassBays will play a key role in making new information available to decisionmakers.

These environmental and management challenges are inextricably linked. Complex challenges like climate change require cross-discipline collaboration, and sharing of tools and ideas across sectors. Encouraging public input, and then taking it seriously, are critical components of identifying feasible solutions for any challenge affecting our common wealth. Lack of data, a management challenge, could just as easily be categorized as an environmental challenge, to the extent that scarcity of data limits our ability to define the challenges that we face.

V.ii. Outcomes

Over the next 10 years, and with this CCMP, the Management Committee expects MassBays to achieve specific accomplishments, outcomes that can be traced back to our own efforts. Contrary to past CCMPs, which listed multiple "lead agencies" responsible for the planned lists of actions, MassBays is setting out programs and projects on which we will take the lead, and responsibility for their completion. The Management Committee holds that this is a more responsible approach, and more likely to result in concrete results. Measures for documenting progress are noted in Section V.iii and following, along with each Action. Those will be the subject of ongoing tracking as part of our yearly progress report and workplan.

[49] Massachusetts Water Resources Authority Water Quality Monitoring, http://www.mwra.com/harbor/html/bhmonitoring.htm

Programmatic outcomes

Programmatic outcomes are the result of projects and programs initiated and carried out by MassBays. While we will rely on funders and partners to assist us in this work, MassBays is taking ownership and responsibility for completion of programs that will deliver the following:

- **Information about habitat conditions across the Bays is documented, and disseminated via a targeted communications strategy.** State of the Bays reporting is a requirement of §320, and a focus of MassBays' outreach and communication efforts. This overarching reporting is in the context of ongoing outreach to highlight MassBays' and the larger National Estuary Program's contributions to improving conditions over time.

- **A majority of MassBays municipalities implement habitat protection and restoration practices, informed by diverse stakeholders, including underserved communities.** MassBays' RCs provide technical support, conduct outreach to underserved residents, and convene stakeholders across sectors, helping municipal decisionmakers implement restoration and protection efforts that are grounded in scientific research and best practices, and that take into account local concerns.

- **Measurable progress toward target conditions across the MassBays planning area.** A central aspect of this outcome is utilization of specific target conditions for habitats in the Bays. A means for documenting trends over time is critical to this outcome, and it is thus tied to the State of the Bays reporting outcome above.

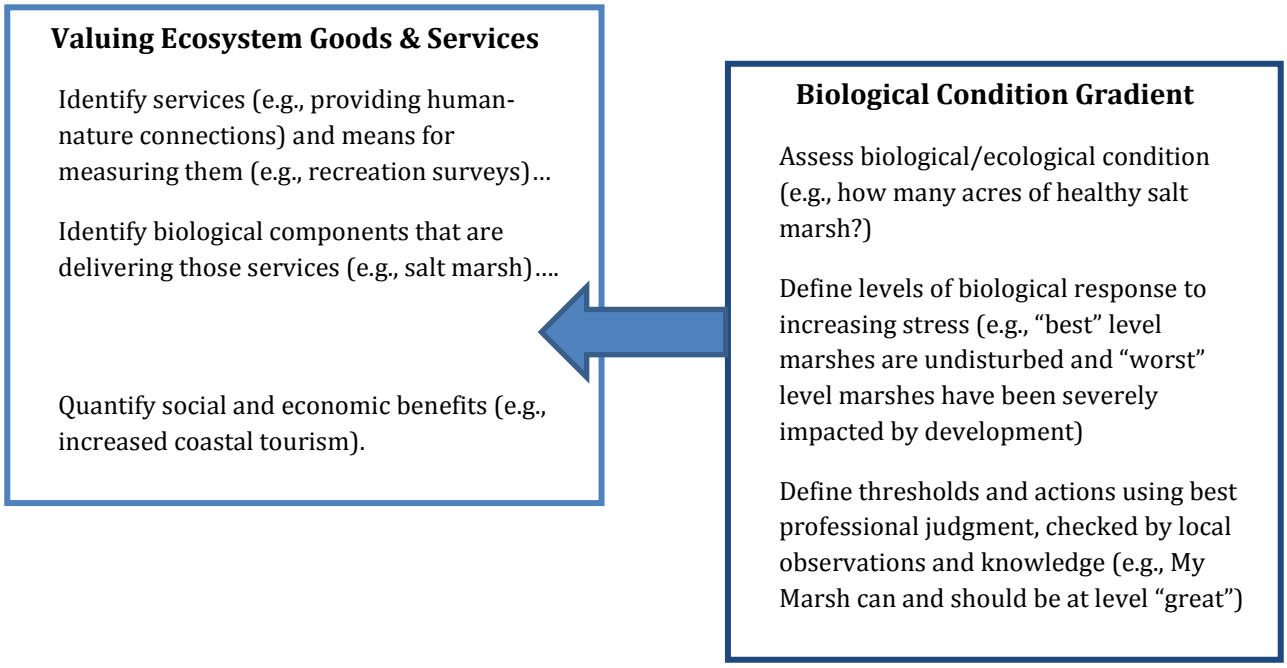
Environmental outcomes

MassBays' desired environmental outcomes are relative to existing conditions, which are not, in many cases, specifically known. A suite of target conditions will guide our forward-looking work, and provide benchmarks for progress. Progress toward the targets will be measured using both our monitoring framework (Attachment 3) and qualitative assessments by LGCs. We seek to document the following environmental outcomes:

- Improved habitat continuity and hydrology.
- More resilient coastal habitat, including implementation of nature-based coastal protection measures.
- Restored natural communities.
- Improved water quality.

These are not outcomes for which MassBays will be able to claim sole credit, even if we complete all tasks described in this CCMP. We do anticipate, however, that MassBays' work to delineate and compile data about individual embayments in the Bays with the EDA positions us to lead a data-driven effort to monitor and report on improved conditions across the Bays. Our unique combination of regional connections and expertise, a non-regulatory focus on coastal habitats, and ability to convene decision makers, scientists, ngos, and the public without bias will be key to our success – as they are for all NEPs.

Our primary means for measuring progress toward these outcomes will be application of two methods for analysis developed by EPA: Biological Condition Gradient (BCG),[50] and Final Ecosystem Goods and Services (FEGS)[51] assessments. From 2018 through 2020, MassBays will work closely with EPA's Office of Science and Technology and Office of Research and Development to demonstrate the utility of these tools for defining, then documenting, environmental improvements.



Management outcomes

Finally, as a result of our work to respond to management challenges, MassBays anticipates the following:

- **Robust interagency and interdisciplinary collaboration and partnerships.** The Management Committee has determined that convening working groups, committees, and partnerships across agencies, disciplines, and sectors is one of MassBays' primary roles. While the Management Committee itself already serves as a forum for interagency collaboration, across and within state and federal agencies, more can be done.

- **Well-informed, multisector input to decision making, including contributions from underserved communities.** MassBays' outreach efforts are focused on fostering not only basic understanding of the science of estuaries, but to build capacity among local community members to ask their own questions and prompt new actions on the part of decisionmakers. This outcome aligns with the tenets of environmental justice and overlaps

[50] Cicchetti, G., et al. 2017. Implementing the Biological Condition Gradient Framework for Management of Estuaries and Coasts. US EPA Office of Research and Development, Washington, DC, EPA/600/R-15/287. https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100SN3Y.txt

[51] Landers, D. and A. Nahlik. 2013. Final Ecosystem Goods and Services Classification System (FEGS-CS). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-13/ORD-004914. https://cfpub.epa.gov/si/si_public_file_download.cfm?p_download_id=515244&Lab=NHEERL

with Programmatic Outcome 2 above: input from all sectors of society including underserved communities, will result in better-informed and more effective actions at the municipal and other levels of decision making.

Again, these will not come about solely through isolated efforts, but through partnerships. However, we are not setting these out as goals for other agencies to address; instead we will take ownership of efforts to bring these outcomes about, and will regularly report on progress.

V.iii. Goals

MassBays' Management Committee has identified two sets of complementary goals, Organizational Goals and Programmatic Goals. MassBays anticipates that, with these goals achieved, we will see specific outcomes corresponding to both environmental and management challenges. The two sets of goals are related to each other, in that MassBays must have organizational capacity to meet the programmatic goals

MassBays' Organizational CCMP goals respond to the questions, "Why should MassBays take the lead on responding to these challenges? What position should MassBays occupy in the network of organizations already working in the coastal zone?" These are internally focused goals that will sustain MassBays as an entity, and build upon the National Estuary Program's presence in the Bays.

Programmatic CCMP goals address the programming, or external services, that MassBays will provide to stakeholders both within the planning area, and the larger NEP and coastal habitat management community. They answer the question, "What will MassBays accomplish?"

	Organizational Goals	Programmatic Goals
1.	MassBays is a primary source for information about conditions and trends in Ipswich Bay, Massachusetts Bay, and Cape Cod Bay.	MassBays provides new resources to support research and management in the Bays.
2.	MassBays is an important influence on local decision making that recognizes the roles, functions, and values of healthy habitats in the Bays.	MassBays reaches all planning-area municipalities with actionable information about coastal habitats.
3.	MassBays is a model program for management and planning that addresses diversity among estuaries.	MassBays provides regular and locally informed State of the Bays reporting that reflects the unique characteristics of MassBays assessment units (embayments, rocky shore, barrier beach), and documents progress toward target conditions.

How will MassBays achieve the goals set out in the previous section? What approach and actions will be taken to bring about the outcomes we've identified as critical for the Bays? MassBays has developed a proactive set of strategies to be applied, and actions to be undertaken, supporting

Goals 1 through 3. These strategies incorporate adaptive monitoring and management, and the actions incorporate stakeholder input over the course of the CCMP development. The following sections describe the goals, strategies, actions, and activities to be undertaken. Where activities are at the community level, specific sequencing of those activities will require flexibility to take advantage of opportunities in political readiness and funding available at the local level. MassBays' yearly workplan will take up activities with the highest likelihood of success given funding, partners' readiness, and concurrent projects by other entities that provide opportunities to advance CCMP implementation.

Goal 1

Organizational: MassBays is a primary source for information about conditions and trends in Ipswich Bay, Massachusetts Bay, and Cape Cod Bay.

Programmatic: MassBays provides new resources to support research and management in the Bays.

Description

These programmatic and organizational goals respond to the management challenge, "Lack of information to support decision making." While some areas within the MassBays planning area have been well assessed and monitored over the previous 30 years (see Section III), most of the delineated assessment areas have not be the subject of long-term monitoring, either for water quality or habitat conditions. Only with data in hand can we select and promote suitable management actions, assess progress over time, and determine research priorities.

Strategy 1.1 Make new data available, especially to address specific gaps in knowledge.

Beginning with the list of gaps identified by local and regional partners between 2013 and 2018, MassBays will work with the Management Committee and others to prioritize initiatives to address the lack of data. MassBays will prompt funders, researchers, students, nonprofits organizations, and government agencies to support new baseline assessment and other data-gathering to increase our ability to take informed steps to improve environmental conditions.

Action 1.1.a Identify gaps in data sets.

Description

A recurring theme of stakeholders' input to the CCMP is the lack of data available to decision makers, across a range of topics. In our effort to be a primary source for information to support action, it only makes sense for MassBays to identify and compile data needs. We will begin with the lists of gaps provided in 2015 and 2018 (see Table 1.1-1) to generate a master list; this will inform subsequent Actions under Strategy 1.1.

Resources required

$

Annual update of the master list will require minimal funds.

0.03FTE per year

Boston staff will compile the master list annually, with input from partners listed.

Table 1.1-1. Data and research gaps identified via public outreach.

Data gaps	Research gaps
Long-term water quality data sets (for areas other than Boston Harbor)	Long-term effects of pollution in estuarine environments impacted by climate change
Assessment of coastal acidification	Changes in predator-prey interactions due to climate change
Coastal bird nesting and migration geolocation	Current extent and future migration of fish species from the Mid Atlantic into southern New England waters
Sediment budgets for connected coastal areas	Ways to reduce pollutant impacts on habitat sustainability
Total volume of wastewater discharge per embayment	Habitat restoration models that take sea level rise into account
Herring outmigration assessment	Assess habitat vulnerability to storm impacts
Quantification/valuation of ecosystem services for individual habitat types	Effect of herbicide application in spawning ponds on larval and juvenile river herring
Quantification/valuation of impacts due to climate change, invasives, altered hydrology, fragmentation, reduced water quality	Cumulative impacts of climate change, eutrophication, and toxic chemicals on "productive capacity" of Essential Fish Habitat
Quantification of freshwater inputs to embayments	Cape Cod Bay fisheries study
Quantification of tidal flushing per embayment	
Long-term biodiversity monitoring	
Ground-truth older mapped data	
Dock & pier coverage of marsh platform	
Dredged areas/dredge extent	
Statistics re: seawall permits over time	
Nutrient monitoring in small embayments	
Hazardous waste contamination	
Stormwater monitoring	
Assessment of local land use regulations for habitat protection	

Outputs

By 2019, post a master list of data gaps, to be updated annually on the MassBays website
By 2020, establish a means for soliciting data needs from partners and community members

Measures

MassBays provides evidence that data needs drive action in annual workplans, and inform target-setting**,** and State of the Bays documentation

Timeline

Ongoing

Partners

MC/STAC, LGCs (identify data gaps)

Action 1.1.b Prioritize addressing gaps per need, completeness and reliability of new and existing data, relevance to underserved/underrepresented communities, application to State of the Bays reporting, and potential policy applications.

Description

The list of data needs is already significantly beyond the capacity of MassBays and agency partners. This action sets out parameters for prioritizing action to fill data and research gaps. They include:

QA/QC assessment. In some cases there are data relevant to the stated need, but their reliability for decision making is unknown. Boston staff will refer to MassBays' Monitoring Framework (Attachment 3) to assess data sets based on the minimum acceptable QA/QC parameters required by STAC.

Benefit to underserved/underrepresented communities. The master list of data needs has arguably been generated based on input from individuals and organizations without connections to underserved and underrepresented communities. Wherever possible, MassBays will solicit input from those communities to address their own stated needs for information and science-based decision making.

Relevance to State of the Bays reporting. MassBays' regional and Bays-wide conditions and trends reporting on any specific parameter requires a baseline data set. Data gaps hinder MassBays' ability to include a broad suite of parameters in the State of the Bays reporting scheme.

Influence on coastal policy. Not all data are directly relevant to policy making. DEP, for example, prioritizes measures included in 314 CMR 4, Massachusetts' water quality standards. Action by policy makers that will improve local water quality and coastal habitats are a priority for MassBays, so any data specifically requested will rise to the top of the prioritized list.

Resources required

$ per year

Convening STAC and RCs will require minimal funding

0.05FTE per year

Boston staff will facilitate efforts to prioritize needs.

Outputs

Annual STAC meeting dedicated to prioritization of data needs.
List of priority data gaps included in each State of the Bays and EDA update.

Measures

Priorities of diverse stakeholders are documented and explicitly incorporated into MassBays' actions to address data gaps.

Timeline
Ongoing

Partners
STAC, stakeholders (underrepresented/underserved communities, policy makers)

Action 1.1.c Maintain Estuarine Delineation and Assessment as a record of current data availability.

Description
The EDA has proven to be an essential component of MassBays' efforts to assess the state of knowledge about the Bays, and a critical component of the BCG (see Goal 3). In fact, the EDA addresses steps 3 through 5 in the BCG process:

3. Determine the biological attributes, measures, and stressors most relevant to management objectives.
4. Delineate and classify the waterbody and watershed of interest.
5. Organize and analyze existing data for the identified measures, collect new data if needed.

It will remain critical to update the EDA periodically, if only to maintain the relevance of the targets set out for improvements in the planning area.

Resources required

$ per update
Funds on the order of $20,000 to $30,000 will be required for a consultant to carry out each scheduled update.

0.1FTE per update
Boston staff will manage the updates.

Outputs
EDA 2.1 (2019), EDA 3.0 (2022), EDA 4.0 (2026)
Online ARCGIS Storymap providing georeferenced, interactive access to EDA data by assessment unit (2019)
By 2022, incorporate a data layer into EDA 3.0 documenting regional disparities in adverse impacts or benefits.

Measures
By 2022, MassBays compiles case studies demonstrating how researchers and others utilize the EDA Storymap as a for their work in the Bays.

Timeline
Updates scheduled for 2019, 2022, 2026

Partners
Consultant (data compilation, update and analysis)
Monitoring and research community (audience)

Action 1.1.d Provide information about data needs to entities funding and conducting monitoring and restoration.

Description

Data that are useful for resource management and local action require funding over the long term. MassBays will disseminate prioritized lists of data gaps to those interested in contributing treasure and/or talent to the effort of documenting baseline conditions, including academic researchers, students, state and federal agencies, local and regional nonprofits and associations, and funders' consortia. At the same time, we will encourage continued monitoring as a critical component of science-based, adaptive resource management.

With reference to our strategic communications plan and finance plan, MassBays will approach potential funders to articulate the importance of having this information, with the goal of securing funds for those carrying out the monitoring efforts. Case studies that connect specific data sets with positive environmental outcomes will be useful to this effort.

For our own part, Healthy Estuaries Grant funding will be directed in part to new studies or monitoring efforts that address data gaps.

Resources required

$$

Outreach to potential funders and research partners will require funding for materials and travel.
Some funds under the Healthy Estuaries Grant program will be directed toward this Action.

0.08FTE per year

Boston staff will develop materials and attend meetings and events to disseminate prioritized data needs and manage Healthy Estuary Grant projects that address this Action.

Outputs

DEP-funded 2020-2023 probabilistic coastal monitoring program (EPA CWA §106) completed by MassBays
Each year, address at least one data gap per year via research, management, or monitoring through the Healthy Estuaries Grant Program (or other)

Measures

All MassBays-funded grants document their project's connection to policy and/or resource management.

Timeline

Ongoing

Partners

NERACOOS, EPA, DEP, DMF, MET, AGM (funding)
Citizen Monitoring Coordinators' Network, universities and colleges, watershed associations and other NGOs, RPAs, MACC, MOTN, NERACOOS (monitoring and audiences)

Strategy 1.2 Support valid (QA/QC) data collection and application.

A major challenge in implementation of this CCMP is the lack of a coordinated data collection system across the Bays. This is mainly due to financial and personnel constraints. Although there are several monitoring programs in the Bays, each is designed to answer questions distinct from MassBays' goal of compiling a comprehensive State of the Bays report on conditions and trends in the Bays. MassBays' Monitoring Framework (Attachment 3) inventories the geographic coverage and parameters measured by past and ongoing monitoring efforts. In some cases, baseline data sets already exist for many embayments, but data have not been not collected using EPA- or DEP-reviewed Quality Assurance Project Plans (QAPPs) or other stringent QA/QC procedures. As an EPA-funded program, MassBays' reporting must draw from quality-assured data sets.

With this CCMP, MassBays commits to establishing a program to build capacity among groups seeking to collect data in the Bays with professional development, one-on-one technical assistance, and tools to validate their data. The results will be data sets useable not only for MassBays' reporting, but acceptable to regulatory agencies for decision making and resource management.

Action 1.2.a Implement a MassBays-wide monitoring framework that incorporates long-term monitoring program data and makes data and findings available to the public

Description

MassBays is fortunate to have an engaged and expert STAC. Over the course of 2018, the Subcommittee developed a Monitoring Framework (Attachment 3) which describes MassBays' need for quality data sets and the criteria for evaluating data for inclusion in MassBays' work, whether for the EDA, State of the Bays reporting, informing resource management agencies, or highlighting potential environmental problems. Under this Action, staff will apply the criteria to evaluate existing data sets for application in MassBays' workplans.

MassBays will share the criteria to support suitable data usage, and guide those collecting data to ensure their data outputs support desired uses.

Resources required

$

MassBays staff and STAC will assess data sets; we will partner with others to share guidance.

0.1FTE per year

Boston staff will maintain contact with monitoring groups and access and analyze data to support Goal 2.

Outputs

Maintain updated inventory of monitoring programs in the Bays relevant for conditions and trends analysis.
By 2021, document baseline conditions for future comparisons.

Measures

MassBays' Eco Health report card (2021, Action 1.3.c) incorporates data sets that meet criteria set out by the Monitoring Framework (Attachment 3).

Timeline

Ongoing

Partners

DEP, EPA, DMF, academia, NGOs (data generation); Northeast Ocean Data Portal, CUAHSI, EPA, DEP, NERACOOS (data sharing & access)

1.2.b Convene and partner with citizen monitoring coordinators, researchers, QA/QC agency staff, others to support and improve monitoring outputs.

Description

While MassBays has limited capacity and relies on others – from state agencies to local nonprofits – to conduct monitoring, long-term, high-quality data are lacking for many parameters. We have found that only a subset of citizen-generated data sets are available or suitable for State of the Bays reporting or inclusion in the EDA, for example. Data are stored in filing cabinets, or in spreadsheets on home computers. A survey focused on Cape Cod nonprofits in 2014 (n=25) conducted by APCC revealed that while some organizations have QAPPs, others use protocols handed down in a manner similar to oral history. Some groups have never conducted statistical analyses of their data alongside a trained scientist or with an accredited institution. In 2016, MassBays asked 24 groups "What are the skills your organization would need to take your monitoring program to the next level?" The responses revealed needs in three areas: program design, planning, and reporting; data management and analysis; and interpretation and dissemination of results (Figure 1.2-1). These findings are consistent with subsequent investigations by the Massachusetts Rivers Alliance and the Northeast Interstate Water Pollution Control Commission (NEIWPCC).

This action includes development of several tools to increase capacity among these groups, thus increasing the number and breadth of data sets that could be used by MassBays.

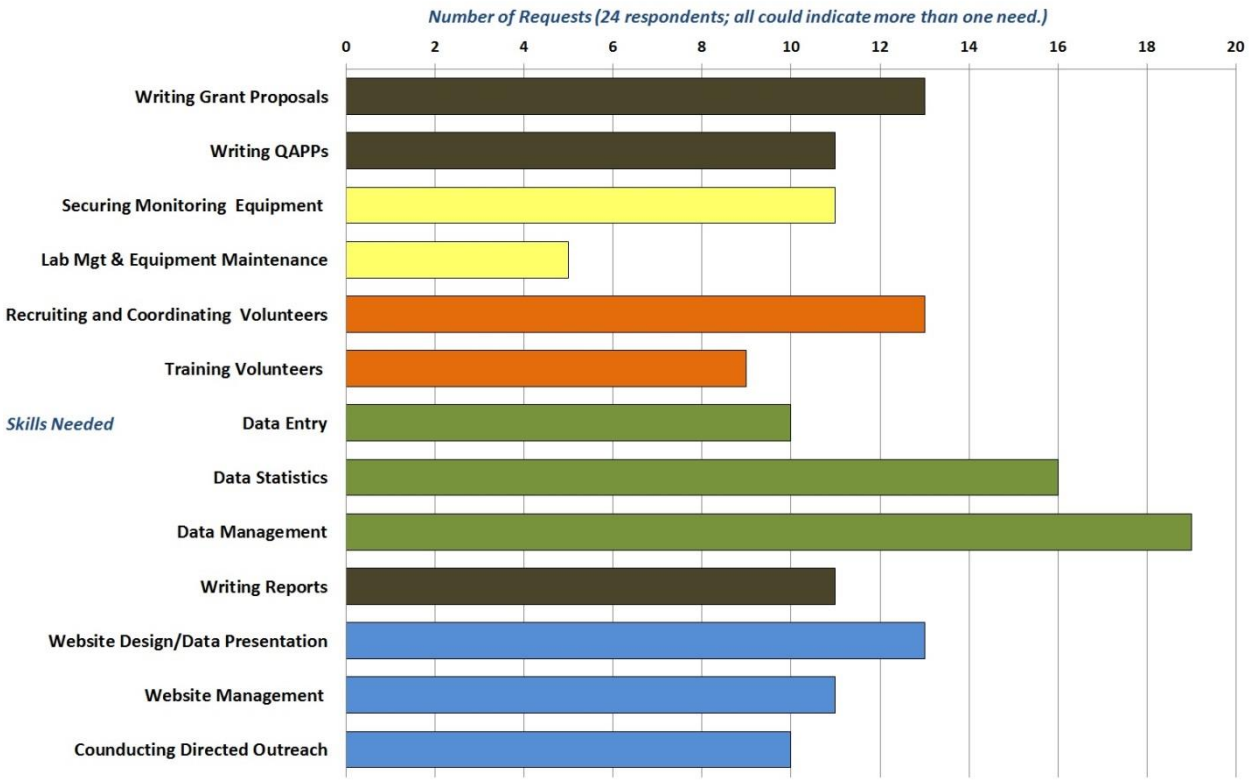


Figure 1.2-1. Citizen Monitoring Coordinators' needs assessment survey results, 2016.

Resources required

$$$

MassBays received $200,000 from DEP (2019) and $200,000 from EPA's Exchange Network (2019-2021) to prepare the initial outputs.

1.4FTE 2019-2021; 0.3FTE subsequent years

Boston staff will lead EPA- and DEP-funded project components, maintain connections to national citizen science data quality efforts, and support the MassBays-wide Citizen. Monitoring Coordinators' Network (2019-2021 and ongoing)
A full-time temporary Circuit Rider will provide one-on-one assistance for statistical analysis, volunteer training, etc. for locally based efforts (2019-2021), a role to be continued at a lesser scale by RCs subsequently.

Outputs

By 2021, successfully complete 2018 Exchange Network Grant deliverables: AquaQAPP (online SAP generator), and circuit rider hire, training, and deployment.
Regular Citizen Monitoring Coordinators' Network meetings
Regular participation in national citizen science data quality evaluation networks

Measures

A robust Citizen Monitoring Coordinators' Network provides quality data to MassBays and others

MassBays presents at regional and national conferences regarding our efforts to increase utilization of citizen science outputs

Timeline

Ongoing

Partners

DEP, EPA (funding)
RCs, circuit rider (tech support)
ANEP, Citizen Science Association, UMass Boston (external connections)
River Herring Network, Citizen Monitoring Coordinators' Network, Massachusetts Rivers Alliance (convening partners)

Strategy 1.3 Analyze and present existing data in multiple formats to document baselines and trends.

If MassBays is to be a primary source for information about the Bays, the information we provide must be presented in a way that is useful to multiple audiences. Data modeling, statistical analysis, interpretation, and visualization will be utilized to bring new and existing data into use by local, state, and federal decisionmakers. Our State of the Bays reporting will be presented online, accessible to communities interested in knowing more about their local coastal ecosystems, and empowering them to ask questions about conditions and trends. MassBays will not host the data itself, but will be able to send those interested to institutions holding the actual data sets for further analysis.

Action 1.3.a Analyze connections among datasets and trends to inform reporting, actions, and policies

Description

The Management Committee has identified provision of data and data interpretation as a key role for MassBays. This Action lays the groundwork for our State of the Bays reporting (Actions 1.3.b and 1.3.c) and outreach, education, and training encompassed in Strategy 2.2 with the launch of an online eco health report card data visualization tool. Other activities include hosting forums, conferences, and meetings to share information about trends with local, state, and federal agencies. The trends we identify will be articulated in relation to resource management policies, both existing and proposed.

Resources required

$

Funding to support partners' participation and maintain data hosting contracts

0.3FTE per year

Boston staff will work with partners to determine metadata and identify parameters suitable for trends analysis.

Outputs

Standard metadata for assessing data from multiple sources
Trends data for specific parameters presented online via a MassBays Eco Report Card

Measures

By 2020, specific parameters are identified for cross-comparisons and reporting via State of the Bays, and revisited as additional data sets become available.

Timeline

Ongoing

Partners

STAC, UMCES/IAN, MIT Sea Grant (data management and analysis)

Action 1.3.b Provide State of the Bays reporting at multiple scales

Description

All NEPs are required under CWA §320 to document and report on conditions and trends in their estuaries in the form of State of the Bays reporting. MassBays is particularly hindered in its efforts to construct a narrative about conditions and trends across the Bays, due to the geographic extent of the planning area, the diversity of habitats, a wide range of physical and biological characteristics not easily generalized, and a paucity of adequate data for such generalizations.

The Management Committee holds that localized State of the Bays reporting is key to both generating and sustaining interest in the health of local habitats among coastal communities. This Action includes reporting at several scales: across the entire planning area, by MassBays region, and at the local embayment level. Standardized metadata, and a reporting cycle that highlights individual regions between the required 5-year State of the Bays reports will enable us to identify common issues across the Bays to be addressed through other Actions.

Resources required

$ per year

Funding to host a Bays-wide Symposium and support regional conferences,

0.3FTE per State of the Bays reporting year (2020, 2025); 0.1FTE ongoing

Boston staff will prepare State of the Bays publications and/or host Symposia, provide support for regional events, and present findings in public venues.

Outputs

Slide decks, posters, and other presentation materials regarding status and trends
Bays-wide State of the Bays Symposia or publications (2020, 2025) include both cross-region and region-specific information and needs.
By 2025, State of the Bays reporting incorporates data relevant to underserved communities as requested by those communities through the RSPs (see Actions 1.1.a and 2.3.b).

Measures

By 2023, MassBays is providing data analysis and reporting not available elsewhere.

Timeline

Ongoing

Partners

UMCES/IAN, MIT Sea Grant (data management)
Resource managers, regulatory agencies (target audiences)

Action 1.3.c Provide online access to State of the Bays reporting

Description

MassBays secured EPA Exchange Network funding in 2018 to retain UMCES/IAN to develop an online eco health report card, similar to those used by the Maryland Coastal Bays, Long Island Sound Study, and Chesapeake Bay Program. The platform allows viewers to select water quality (and other) parameters, then click on a geographic area of interest to see both current conditions, and trends over time (see Figure 1.3-1).

Resources required

$$

Funding for the eco health report card development is included in the 2019-2021 EPA Exchange Network grant. Assistance with data management/report card maintenance from MIT Sea Grant or contractors may be necessary as the quantity of data available increases.

0.3FTE per year

Boston staff will maintain the online report card, updating with new data as they become available.

Outputs

By 2021, launch online eco health report card available via a link from massbays.org.

Measures

By 2021, trends data for core water quality parameters are incorporated into online eco health report card, and easily accessed by stakeholders and decision makers.

By 2022, BCG targets are incorporated into the eco health report card as markers for measuring progress toward improved conditions (see Action 3.1.b).

Figure 1.3-1. Example Eco Health Report Card for Maryland Coastal Bays NEP.

Timeline

Ongoing

Partners

UMCES/IAN (eco health report card development and hosting)
MIT Sea Grant (data management)
Resource managers, regulatory agencies, ngos, municipal officials (target audiences)

Goal 2

Organizational: MassBays is an important influence on local decision making that recognizes the roles, functions, and values of healthy habitats in the Bays.

Programmatic: MassBays reaches all planning-area municipalities with actionable information about coastal habitats.

Description

Work under Goal 2 moves beyond data about conditions and trends to ask questions about ecosystem functions, and the value of those functions to MassBays communities and beyond. Actions under this Goal will advance our understanding of the impacts of climate change, examine alternative management options for adaptation, and promote responses that sustain coastal habitats and maintain their critical functions.

MassBays will work with partners to disseminate this information to target audiences that can and should take action in response: local, state, and federal agencies, regional planning agencies, land and resource managers, and coastal residents. When MassBays *reaches all planning-area municipalities with actionable information about coastal habitats*, we will also encourage them to take up habitat protection and restoration.

Further, Goal 2 incorporates concerns about environmental justice, as we seek input to decision making by under-represented and underserved communities both through our own organizational structure and by facilitating access to decisionmakers and decision making processes for communities otherwise overlooked in coastal planning.

Strategy 2.1 Support and conduct research to address gaps in knowledge regarding ecosystem conditions and functions.

MassBays' Healthy Estuaries Grant Program, the successor to the MassBays Research and Planning Grant Program, was established to provide catalytic funding for pilot projects, proof-of-concept investigations, and small-scale research efforts. Our goal is to provide grantees with information and best practices they can propose for subsequent proposals to larger funders. Actions under this strategy are focused on making sure the limited funds available for this small-grant program address gaps in understanding to inform policy, future research, and MassBays' own actions.

Action 2.1.a Identify, evaluate, and support research regarding effectiveness of conservation & restoration activities.

Description

The Healthy Estuaries Grant-making process itself is a way for MassBays to learn about research questions, data collection needs, and the players working in the planning area. Each of the following steps open possibilities for synergies, innovative approaches, and new knowledge that can advance MassBays' own goals:

Announcing the RFP through multiple outlets increases the chances that we will identify many previously sidetracked projects.

The requirement for a Letter of Interest allows potential applicants to test out their idea and make their case for its relevance without an inordinate amount of effort. This lower bar for initial application brings new ideas forward, and allows MassBays to provide feedback regarding potential synergies with existing efforts and/or other partners.

The proposals themselves must address several components that demonstrate connections between the work and the CCMP, and the proposal evaluation process includes review by at least one member of the Management Committee, a past grantee, and host agency representatives (EPA and CZM). Discussions about the proposals are rich and informative.

Announcing selected proposals provides an opportunity for MassBays to share its mission and purpose with the larger community, sparking new connections.

Resources required

$$

For efficiency, MassBays prefers not to set out an RFR without about $100,0000 to distribute. An 18-month project period no only gives applicants two sampling seasons for research, but allows us to set aside a minimum amount of funds each year from our operating budget.

0.25FTE

Boston staff draft the RFP, solicit contributions, organize review, announce awards, prepare scope of work, and track progress.

Outputs

Each year, allocate at least 5% of MassBays annual budget to Healthy Estuaries Grant, to be distributed on an 18- to 24-month schedule.

Measures

All funded projects document policy/resource management implications of grant project results
Each funding cycle, there is an increase in the number of high-quality and relevant Letters of Interest.

Timeline

Ongoing; grants will be solicited biennially (2019, 2021, 2023, 2025, 2027)

Partners

MC, STAC (announcements & outreach)

Action 2.1.b Test and implement innovative monitoring (including rapid field assessments), and restoration approaches

Description

The RSPs are forward-thinking, creative partners in MassBays' efforts. This Action encompasses their work in the regions, as well as Healthy Estuaries Grant-awarded projects, and Boston-based staff's cross-region work, including:

- Partnerships to pilot, test, and demonstrate new restoration approaches.
- Research and development of monitoring methods for emerging contaminants.
- Evaluation of approaches used elsewhere as to their suitability for MassBays' planning area.
- Participation in rapid assessments, blitzes, and data challenges.

Resources required

$$

RSP grants are the primary expense under this Action

0.2 FTE

Boston staff will initiate and support collaborations, and track RSP activities according to yearly workplans.

Outputs

An Annual Report including highlights describing work under this Action
Quarterly reports from RSPs on activities under this Action

Measures

In both 2023 and 2028, MassBays' PE documents evidence for an "exceeds" ranking on this Action.

Timeline

Ongoing

Partners

State & federal agency scientists, academic & research institutions, citizen scientists, ngos, marine tech business and consultants (collaborators)

Action 2.1.c Support cross-sector information sharing

Description

Early in MassBays' history, the program hosted a Massachusetts Bay Symposium to share findings from the numerous efforts underway to restore Boston Harbor and Massachusetts Bay. In 2015, MassBays hosted a State of the Bays Symposium, which brought together more than 100 scientists, policy makers, educators, and interested laypersons to consider conditions and trends in the Bays. Many attendees, in the post-event evaluation, asked for more frequent gatherings to facilitate networking among people working on habitat issues in the Bays. Separately, STAC has suggested that we bring the Healthy Estuaries Grant awardees together to share their research and findings. Finally, with our shift to more localized reporting, it is important that we provide forums for

information exchange, and opportunities to identify data and research gaps that will help us fill in the details about our planning area conditions and trends.

This Action calls for MassBays to disseminate and promote research in the Bays, to share challenges and successes, and promote transferability of findings.

Resources required

$

Outreach and meeting expenses

0.1 FTE

Boston staff will identify co-hosts for regular meetings, at least biennially.

Outputs

Meetings of researchers working in MassBays (e.g., Healthy Estuaries recipients) in 2020, 2022, 2025, 2027.
Regional meetings or forums convened by RCs each year.

Measures

MassBays' sponsorship and/or engagement is acknowledged by partners in online and printed reports and other materials.

Timeline

Outreach about research in the Bays will be conducted on an ongoing basis, researchers et al. will be convened in 2020, 2022, 2025, and 2027

Partners

Healthy Estuaries grantees, STAC, RARGOM, MOTN, NERACOOS, GOMC (audience-participants)

Strategy 2.2 Provide education, training, and technical support; share case studies (successful and not); and support collaboration and cooperation on specific topics.

MassBays' ability to improve coastal habitats lies, in part, with our ability to communicate well with multiple audiences. MassBays conducts limited monitoring and field research, and lacks resources to fund significant restoration projects. This strategy recognizes our ability to convene those who do conduct research and restoration, and broker collaboration that leads to implementation. It also calls for increased investment in MassBays' capacity to carry out communications and outreach efforts.

Action 2.2.a Revise and disseminate existing effective education and outreach materials, and develop new materials and outreach efforts, providing context and integrating multiple sources.

Description

This Action is central to MassBays' success in engaging municipalities in protecting and restoring coastal habitats. Conducting needs surveys, presenting case studies, convening stakeholder meetings and professional networking groups, and building a useful and robust website are merely the groundwork for a successful education and outreach program. Currently, MassBays' efforts on this Action are inconsistent. The 2018 Strategic Communications Planning and Recommendations report (Attachment 1) lists hiring staff or otherwise securing increased capacity for this work as a high priority. The Finance Committee (Attachment 2) agrees that this is a funding priority.

Resources required

$

This is the only Action in the CCMP that cannot be covered by existing levels of §320 funding. Hiring staff requires consistent and reliable funding, and Commonwealth of Massachusetts approval.

1.1 FTE

This would be a new hire for MassBays (1.0FTE) and requires time for planning to be carried out and/or reviewed by Boston staff.

Outputs

Each year, at least 30 of the 50 towns in MassBays' planning area are significantly engaged, as grant partners/recipients, e.g., by implementing restoration or retrofitting for stormwater management, or engaging in joint education and outreach efforts.

By 2025, Update/revise/contextualize and disseminate five education and outreach products to reach target audiences.

Measures

By 2022, increase MassBays' capacity for communications and outreach by 0.5FTE/y.
By 2028, establish an estuary-focused subgroup within NEOSEC.

Timeline

Ongoing

Partners

municipal staff, residents (audiences);
CZM, watershed associations, MEMA, MIT Sea Grant and EPA social scientists (content resources)
NEOSEC, CZM, DMF, DER, NGOs (partners for dissemination)

Action 2.2.b Engage with municipal decisionmakers and residents for habitat protection and restoration to mitigate impacts of increased freshwater inputs, sea level rise, and storm surges, including promoting nature-based approaches.

Description

This Action, directly relevant to the impacts of climate change, encompasses the work of MassBays' RSPs at the local level. Other agencies, including EEA, CZM, and DER, provide funding to municipalities to respond to climate change impacts; MassBays provides technical support, convenes regional meetings, and assists with grant proposals to make local progress on adaptation and mitigation.

Resources required

$

RSP grants are the primary expense under this Action

0.05 FTE

Boston staff provide access to state agency and EPA expertise, and connections to regional and national efforts.

Outputs

Each year, each RSP assists on at least two funding proposals (e.g., Letter of Support, proposal review).
Each year, document four cases in which MassBays has influenced local decisionmaking (e.g., serving on an advisory group or other decisionmaking body, submitting comment letters).

Measures

MassBays RSPs are recognized by municipal staff as important partners in responding to climate change, as evidenced by letters of support for their yearly workplans.

Timeline

Ongoing

Partners

CZM, DER, EPA (science content)
TNC, MLTC, TTOR, Mass Audubon (education content & sites)
Local ngos (engagement efforts)

Action 2.2.c Communicate about climate change impacts and vulnerabilities at the local level.

Description

MassBays' ability to reach individuals in coastal communities situates us as important partners in higher-level efforts, whether planning or implementing adaptation and mitigation efforts. Existing capacity (primarily with the RSPs) should be augmented with additional staffing in the Boston office to make their efforts the most efficient. For example, the MassBays Communications Plan

should include climate change as a specific topic, and include efforts to highlight "green infrastructure" activities happening around the Bays and beyond for local consideration.

Resources required

$

Minimal funding is required for this effort; costs should be rolled up with other Actions.

0.1 FTE

MassBays should dedicate Boston staff time to this effort, in collaboration with CZM outreach efforts.

Outputs

By 2022, produce communications plan to include climate change outreach aligned with and complementary to other agencies' efforts.
Each State of the Bays report (Action 1.3) includes case studies.

Measures

By 2022, MassBays' Boston-based outreach efforts are established, including annual, joint outreach efforts with partners (e.g., King Tide, Estuaries Week, City Nature Challenge, etc.).

Timeline

2020 and ongoing

Partners

ANEP, RAE, EEA, NEAq, NEOSEC, NPS, TTOR, TNC, MassAudubon (education content and sites)

Strategy 2.3 Provide access to, and increase influence on decision making by underserved communities.

Traditional environmental conservation organizations have been struggling for years to respond to inequities in exposure to pollution and access to green space among communities of color, immigrant communities, and low-income neighborhoods. MassBays is committed to picking up these issues in our planning area, and contributing our technical expertise, connections within state government, and other resources to assist groups already working toward more equitable conditions in Massachusetts. We will not impose our own solutions, but will listen for opportunities to support those groups.

Action 2.3.a Review and adjust Management Committee composition to ensure diverse, representative input to MassBays' planning.

Description

According to historical program documents, MassBays' Management Committee included 48 members in 1993, and 31 in 1998. Around 2009, the current composition of MassBays' Management Committee was established to designate seats for partner and stakeholder groups, and the LGCs were more clearly tasked with setting priorities at the regional level. Representation on the Management Committee deserves revisiting at this point, to make sure that any gaps in the

roster – including missing sectors or under-represented/underserved communities – are addressed.

Resources required

$

Minimal funds will be needed to implement this Action

0.05 FTE

The Director will commit time to reviewing the Committee's SOPs and solicit review and comment on proposed changes from the Committee members.

Outputs

By 2020, Management Committee SOPs reviewed and revised as needed.

Measures

By 2020, Subcommittee membership is diversified with active engagement of new representatives from public health, business, technology, formal and informal education, and other sectors.

Timeline

2019 through 2021

Partners

MC Nominating and Governance Subcommittee, EEA, EPA EJ and Urban Waters offices (advise)

Action 2.3.b Engage partners who work with underserved communities in MassBays' regions.

Description

This Action is similar to 2.3.a, but focused at the regional level. RSPs will evaluate their own LGCs' representation of multiple sectors and interest groups, including underserved and under-represented communities. RCs will facilitate direct access to decision makers at the local, state, and federal level where appropriate, to break down barriers between impacted communities and policy-making.

Resources required

$

RCs will dedicate some time to recruiting representation and input from diverse stakeholders, especially regarding their yearly workplans.

0.1 FTE

Boston staff will provide advice and support as requested.

Outputs

Each year, RCs will document measures taken to support diverse community access to meetings, events, and decisionmakers.

Measures

Each year, MassBays attributes action on at least one initiative to requests, or programs identified or selected for action, by underserved communities.

Each year, representatives of groups based in underserved communities regularly engage in activities at the regional level.

In 2023 and 2028, representatives of underserved/ underrepresented communities will report on MassBays' engagement as part of the EPA PE.

Timeline

ongoing

Partners

EPA EJ & Urban Waters programs, local EJ organizations (evaluation)
RPAs, MMA, RSPs (connections to decisionmakers)

Goal 3

Organizational: MassBays is a model program for management and planning that addresses diversity among estuaries.

Programmatic: MassBays provides regular and locally informed State of the Bays reporting that reflects the unique characteristics of MassBays assessment units (embayments, rocky shore, barrier beach), and documents progress toward target conditions.

Description

Goal 3 demonstrates MassBays' willingness to step forward and provide testing grounds for new approaches to coastal habitat assessment and management. The diversity and geologic and geographic breadth of our planning area, as described in Section III, precludes one-size-fits-all responses to ecosystem change. With assistance from EPA researchers, regional research associations, and Massachusetts-based experts, MassBays will demonstrate application of the Biological Condition Gradient and a Final Ecosystem Goods and Services assessment to setting targets for embayments based on current conditions and future potential for improvement. Those targets will be shared with local and state actors – see Goal 2 – to advance restoration efforts.

Finally, to sustain MassBays' efforts into the future, the Management Committee recognizes that we must maintain our status as an Estuary of National Significance under S.320 of the Clean Water Act. While continued 320 funds are assumed to be adequate to meet the goals set out here, additional funds would allow MassBays to expand these actions from pilot programs to ones that would be widely implemented, from region-specific efforts to Bays-wide efforts, and from single-sector initiatives to multi-sector programs. The Management Committee's Finance Subcommittee developed, and the Management Committee approved, a Finance Plan and recommendations for fiscal sustainability both of MassBays and efforts under the CCMP, included as Attachment 2.

Strategy 3.1 Establish target (improved) water quality and habitat conditions tied to desired uses and ecosystem services.

MassBays' efforts to drive improvements in habitats across our planning area will be informed by site-specific targets, developed through comparisons among similar systems. No longer comparing apples to oranges – or Salem Harbor to Wellfleet Harbor – MassBays is working with EPA's Office of Research and Development to apply a Biological Condition Gradient (BCG) framework for the Bays. This tool is used to set out desired ecological conditions for a specific system, and the parameters to be used to monitor those conditions, to track improvements over time. MassBays is in the forefront of efforts to apply BCG in the National Estuary Program. EPA is providing technical services to support development of targets for our embayments; we are also exploring opportunities to incorporate another EPA tool (Final Ecosystem Goods and Services, or FEGS) which will help us to describe the economic value and health benefits of improved environmental systems.

Action 3.1.a Identify indicators and metrics to describe diversity and similarities among embayments, rocky shores, beaches and dunes across MassBays' planning area.

Description

Action 3.1 is central to MassBays' new approach to gaining improvement in the Bays using the BCG. MassBays has partnered with Northeastern University to identify factors that determine similarity among the 47 embayments identified through the EDA. Statistical analyses to "lump and split" the embayments by determining characteristics will allow us to treat similar embayments (and later, beaches, rocky shores, and dunes) as similar for target-setting. Activities under this Action include applying data gathered via EDA updates, and considering new data sets – including predictions of climate change impacts – that could distinguish among assessment units.

Resources required

$

EPA is providing in-kind support, and MassBays will invest funds to collect and analyze new data sets.

0.1 FTE

Boston staff time will be expended primarily on coordinating various contributors to the effort, and providing a big-picture view of the effort. Maintaining a cross-walk between the EDA and EPA contractors will be a significant role.

Outputs

By end of 2020, produce and disseminate a public document describing the process used to categorize embayments.
In 2021, 2024, and 2027, extract relevant data from the updated EDA to refine targets as needed.

Measures

MassBays' BCG targets continue to be relevant in out-years.

Timeline

2020, 2021, 2024, 2027 BCG updates based on updates to the EDA (Action 1.1c)

Partners

EPA ORD and OST, Northeastern University, STAC (methodology and guidance)
ISMN, RARGOM, NERR, MIT Sea Grant (input to metrics, target-setting)

Action 3.1.b Identify target conditions to guide management and restoration decisions.

Description

Target-setting using the BCG approach is an 11-step process to define desired conditions, and consider the levels of stress that exist in the ecosystem (see Figure 3.1-1). Targets will be developed according to embayment type, rather than individual embayments. Then, starting with the EDA, and drawing from products like the Integrated Sentinel Monitoring Framework which identify the

parameters most useful for tracking ecosystem change, MassBays will revise the monitoring framework included here (Attachment 3) to describe plans for tracking conditions and trends over time according to Action 3.2.c.

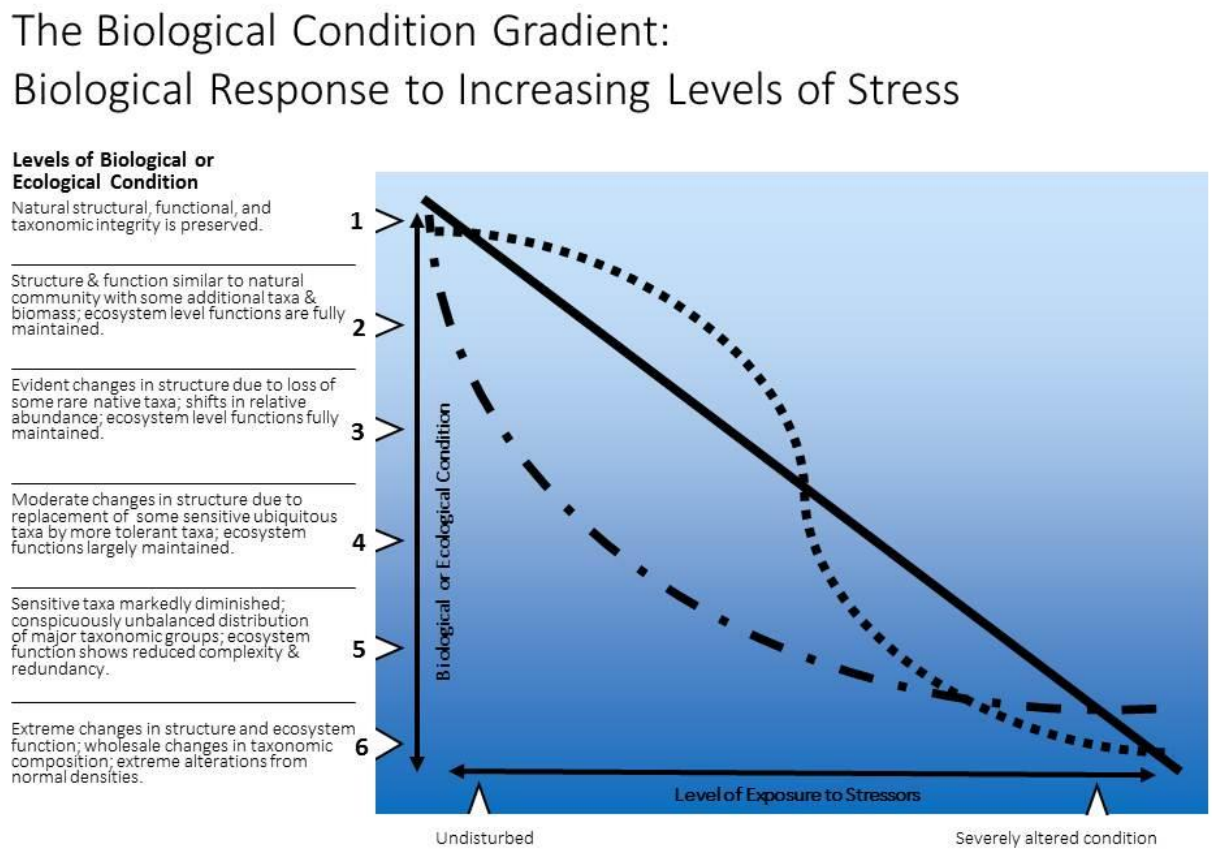


Figure 3.1-1 Levels of environmental conditions related to exposure to stressors, the basis for a BCG analysis.

Resources required

$

BCG development costs are minimal thanks to EPA in-kind support

0.1 FTE through 2021

Boston staff will host expert roundtables and public meetings to develop and then vet proposed targets

Outputs

By 2019, inventory and extract historical data for incorporation into BCG.
By 2020, identify target conditions for each embayment type.

Measures

By 2021, assign target conditions to individual embayments, and incorporate those targets into Bays-wide and regional annual workplans using measures as identified.

Timeline

2019-2021

Partners

STAC, EPA ORD and OST (methodology and guidance)
UHI, ISMN, RARGOM, NERR, Sea Grant (input to metrics, target-setting)

Strategy 3.2 Guide local action to expand habitat and improve water quality according to targets.

This strategy relies on the local connections and established partnerships of MassBays' Regional Coordinators, as they share with decisionmakers and planners the target conditions identified by stakeholders through the BCG and FEGS. With the targets as guideposts, and regular reporting on progress, MassBays will utilize adaptive management to shift resources, justify investments, and encourage persistent efforts to improve local conditions.

Action 3.2.a Develop and implement action plans according to targets.

Description

MassBays' RSPs will build on the outreach efforts and results of Action 3.1.b to initiate discussions with municipal staff, local organizations, and other stakeholders to scope out yearly workplans. This work will bring the Bays-wide vision to the local level, where specific activities – stormwater management and LID, habitat restoration, and updated resource protection practices – should improve environmental conditions, implemented under Action 3.2.b and measured under Action 3.2.c.

Resources required

$

Minimal funding, as this work is incorporated into RSPs' proposals to MassBays

0.1 FTE

Boston staff will compile regional workplans into a MassBays-wide annual workplan

Outputs

Annual Bays-wide workplan identifies interim objectives toward implementation of CCMP goals.

Measures

MassBays' annual workplan incorporates priorities of local stakeholders, based on progress toward target conditions.

Timeline

Ongoing

Partners

RSPs, LGCs, MC

Action 3.2.b Promote activities to improve and protect estuarine values and resources.

Description

With agreements in hand as to annual workplans, the RSPs will provide support to local efforts, for example by:

- Evaluating success of restoration efforts.
- Prioritizing habitat conservation and restoration projects based on regional needs assessments.
- Encouraging and supporting post-restoration monitoring for at least five years.
- Disseminating findings, sharing successes and challenges.

Resources required

$

This work forms about 20 percent of the RSPs' annual budget, or about $60,000/year

0.15 FTE

MassBays staff will track and report progress on MassBays' annual workplan

Outputs

Quarterly reports on activities provided to MC

Measures

Restoration efforts are based on regional prioritization for action

Timeline

Ongoing

Partners

NOAA, DER, DMF (restoration funding and implementation) municipal officials and staff, local organizations, others (priority-setting)

Action 3.2.c Measure and report on progress toward targets.

Description

With targets set (Action 3.2.a) and activities implemented that are focused on meeting those targets (Action 3.2.b), MassBays should begin to see improved environmental conditions. Action 3.2.c includes implementing MassBays' monitoring framework, submitting annual reports on restored habitat to EPA via NEPORT (NEP Online Reporting Tool), and providing stakeholders with an interactive way to track progress via an Eco Health report card. This tracking will support adaptive monitoring and management, as we assess correspondence between actions and outcomes.

Resources required

$

This Action requires funding to maintain the Eco Health report card.

0.1 FTE

Boston staff will focus on reporting and dissemination of information via the Eco Health report card.

Outputs

Annual regional workplans include targets and reports on progress toward targets, based on local data sets as available.

Measures

Beginning in 2023, biennial updates to Eco Health report card document progress toward targets. Adaptive management and monitoring is carried out; i.e., MassBays' monitoring framework and RSPs' workplans are informed by biennial assessments.

Timeline

2021 and ongoing

Partners

DEP, DMF, EPA, MWRA, non-governmental monitoring groups (data)
UMCES/IAN (report card hosting)

Strategy 3.3 Maintain MassBays' National Estuary Program status

EPA sets out multiple and significant requirements for maintaining NEP status. Yearly progress reports and workplans, annual meetings with EPA staff in Washington DC, regular comprehensive program evaluations (PEs), financial reporting, and impact reports (habitat restoration and leveraged resources) are prerequisites to funding under CWA S.320. This strategy requires close attention not only to EPA's guidance and mandates, but Congressional support for the National Estuary Program itself. MassBays will continue its efforts to prove the value of federal investment in the Bays.

Action 3.3.a Conduct evaluation of organizational and programmatic impact.

Description

The primary tools for evaluation of MassBays' progress under the CCMP are the annual report (bundled with the annual workplan) provided to EPA (Action 3.2.a), and the PE conducted for each NEP every five years. The process includes submitting a spreadsheet documenting actions over the previous 5-year period, narrative describing the structure and practices of the NEP to EPA Region 1 and EPA Headquarters staff. (Table) illustrates the extensive reporting required. MassBays has consistently received a "Pass" on PEs. (This highest possible score, indicating compliance with EPA guidance and suitable progress on the CCMP).

Also included in this Action is external evaluation of MassBays' communications impact, per the recommendations listed in the report included here as Attachment 1.

Resources required

$/years 2023 and 2028

Funding for transportation to site visits, materials, etc.

$/years 2025 and 2029

Communications evaluation consultant

0.5 FTE in years 2022 and 2027

Compiling documentation and hosting site visits for the PE requires considerable time on the part of Boston staff and RCs in the year leading up to the delivery date.

Outputs

Each year, document local support of MassBays programming and initiatives from agency, nonprofit, individual, and research community in each region.
Each year, S.320 funding granted to MassBays is be equal to other NEPs' base funding allocation.
Comprehensive external evaluation reports regarding MassBays' communications impact.

Measures

MassBays receives findings of "Pass" (highest category awarded) from EPA through the PE process.
MassBays documents impact of communications efforts to target audiences.

Timeline

PE 2023, 2028; Communications external evaluation in 2025, 2029

Partners

grantees, RSPs (reporting)
Communications Subcommittee (advice)

Action 3.3.b Establish and support collaborative efforts in MassBays' regions that increase opportunities to leverage new resources.

Description

EPA tracks leveraged resources – funding and in-kind support – that augment their own investment in the NEPs' efforts. MassBays' leveraged expenditures on programs and projects across the planning area are presented in Figure 3.3-1. This Action commits MassBays to continuing to increase resources that are brought forward for implementation of the CCMP. Activities include tracking potential and existing partners' contributions, engaging with regional (e.g., Gulf of Maine and Massachusetts' South Shore) partnerships, strengthening connections to the business and technology communities, and facilitating new partnerships for joint funding proposals.

Resources required

$

Free online tracking systems should be utilized

0.3FTE

Boston staff currently spend time on annual reporting to EPA through NEPORT. Implementation of this Action will require some input from a Communications staff person,

not yet funded. Communications staff would spend at least 0.2FTE per year cultivating partnerships.

Outputs

Each year, prepare at least one multi-partner proposal for funding from entities other than EPA.
Each year, set and meet targets for engagement with the business/technology sector at the regional level.

Measures

Between 2019 and 2023, document (and report via NEPORT) 25% increase in average leveraged resources; between 2024 and 2028 document 50% increase in average leveraged resources, compared to 2012-2017 5-year average of $6 leveraged per §320 dollar.[52]

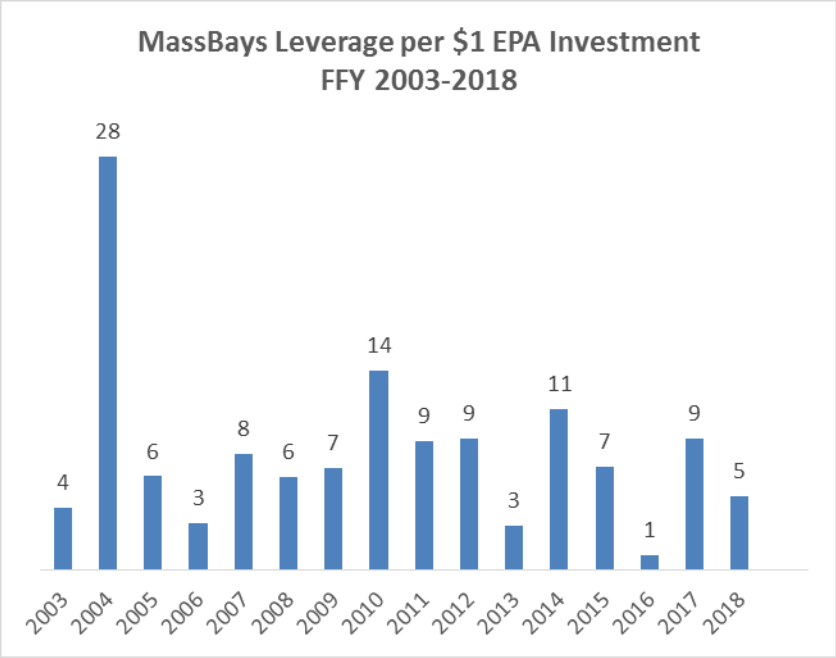


Figure 3.3-1 Ratio of cash and in-kind investment leveraged (dollar-to-dollar) with §320 funds per federal fiscal year, recorded as "primary," "significant," and "support" categories under EPA reporting definitions.

Timeline

Ongoing

Partners

Any and all potential and existing partners

[52] Per EPA's website, "Leveraged dollars are defined as the dollar value (cash or in-kind equivalent) of resources dedicated to implementing an NEP CCMP above and beyond the funding provided to the NEP under Section 320, including earmark funding. "Primary" leveraging indicates that the NEP Director and staff, rather than NEP partners, played the central or leadership role in obtaining the additional resources." https://www.epa.gov/nep/financing-strategies-used-national-estuary-program

Attachment 1. Communications Strategies and Recommendations

Massachusetts Bays National Estuary Program CCMP Draft Final for EPA Review

MassBays

PACER STRATEGIES, LLC

Table of Contents

INTRODUCTION

The Massachusetts Bays National Estuary Program's Strategic Communications Plan is designed to broaden awareness of MassBays' program, work and accomplishments and is intended to help implement its Comprehensive Conservation and Management Plan (CCMP). When successfully executed, this communications plan will help grow MassBays' audience and partnerships and help achieve its underlying mission to protect, restore and enhance the estuarine resources of Ipswich Bay, Massachusetts Bay and Cape Cod Bay.

This communications plan also responds to many of the findings and recommendations made by the U.S. Environmental Protection Agency in its 2017 Program Evaluation (PE). The EPA identified a number of areas for improvement in MassBays outreach and public involvement plans and program recognition.

This communications plan will allow the Management Committee to successfully address EPA's PE findings and help ensure that MassBays remains eligible for future funding authorized by the Clean Water Act.

The CCMP is an 8 to 10-year roadmap for achieving the organizational and programmatic goals identified by the Management Committee. Key to reaching those goals over time will be the continued engagement and support of a wide and diverse group of stakeholders. This communications plan identifies those stakeholders, the unique messages we believe will move them to action, the tools to deliver those messages and metrics for determining success.

COMMUNICATION PLAN GOALS AND OBJECTIVES

The overall goals of the communications plan are to:

1. Broaden awareness of MassBays and its programs

2. Highlight scientific research, monitoring and management needs across the planning area.

3. Invite current and new partners to participate actively in implementing the CCMP

These goals will help MassBays achieve the organizational goals laid out in the CCMP:

- Position MassBays as a primary source for information about the conditions and trends in Ipswich Bay, Massachusetts Bay and Cape Cod Bay

- Increase the level of influence MassBays has on local decision making that recognizes the roles, functions and values of healthy habitats in the Bays

- Make MassBays a model program for management and planning that addresses diversity among estuaries

SITUATIONAL ANALYSIS

MassBays staff has made great progress over the last few years in raising awareness of the organization and bringing clarity and cohesiveness to its vision, mission and branding. A new logo has given the organization a clear public identity and the mission and vision give the organization a succinct way to explain its work.

MassBays has also developed partnerships with organizations who are similarly concerned with protecting our waters and our environment and have worked creatively together to raise awareness of critical issues like the localized impacts of sea level rise, while at the same strengthening MassBays' identity and influence.

For example, MassBays participated in 2014 and 2015 in a Gulf of Maine-wide photo contest documenting the localized impacts of King Tides. When notified that the effort had not been funded in 2016, MassBays took the lead on creating a Massachusetts-specific partnership to raise awareness of the impact of the King Tide on local Massachusetts communities. The 2016 King Tide photos were uploaded by partners and citizens to Massachusetts Office of Coastal Zone Management's MyCoast website using a free smartphone MyCoast app, resulting in MassBays' name and mission being shared with citizens throughout the region and more than 200 photos shared each year.

MassBays has also been successful in increasing its visibility through the co-sponsorship of regional conferences with its Regional Coordinators. Each MassBays Regional Coordinator worked closely with partners to plan and implement conferences for stakeholders, on topics relevant to MassBays' goals and intended outcomes.

Conferences have included the *Annual Great Marsh Sea Level Rise Symposium*, which educates and informs the Great Marsh community on the local threat from sea level rise and potential mitigation; the *25th Anniversary Symposium: Finding Solutions to Our Coastal Challenges*, exploring local impacts and responses to climate change in the Lower North Shore region; *North Shore Resiliency Workshop* regarding tools and methods for engaging communities in successful coastal resiliency planning and implementation; *Colleague Tour and Reception* in the Metro Boston region to explore opportunities for partnerships and collaboration; the Cape Cod Coastal Conference and The Future of Water in Southeastern Massachusetts Conference among others.

While MassBays continues to make progress through these methods and others in raising awareness of its brand to a larger audience, there other elements of MassBays' organizational structure that make it challenging to deliver a cohesive message and share timely and important information and successes with key stakeholders.

As noted in the EPA's 2017 Program Evaluation, the current organizational structure, whereby MassBays is hosted by the Massachusetts Office of Coastal Zone Management, has created real and perceived challenges to MassBays' autonomy and its effectiveness. Press materials, social media and other key communications tools must be approved by CZM, the Executive Office of Energy and Environmental Affairs and the Governor's Office. This multi-layered approval process slows MassBays' ability to share important information and to receive the credit it needs to continue to raise its profile with key stakeholders. The state website and social media guidelines, also applied to MassBays, severely limit MassBays' ability to engage stakeholders and the public.

And while MassBays is hosted by CZM, MassBays does not receive any state funding that would allow MassBays to increase its communications capacity. With just one full-time staff and one part-time employee, MassBays does not have the personnel bandwidth to develop or execute on a successful communications strategy. Without a dedicated communications employee, MassBays will continue to struggle to deliver its message, increase its visibility and share its successes.

This plan recognizes those challenges and includes recommendations for remedying them in order for MassBays to reach its communications goals and successfully implement the CCMP.

TARGET AUDIENCES

Support for the protection, restoration and enhancement of the MassBays area depends heavily on effective communications that are aligned with the concerns and goals of the intended audience. The general public, for example, may be more interested in the recreational opportunities afforded by the MassBays coastal areas, while local governments may be highly focused on the resiliency needs of their communities in the face of increasing evidence of the impacts of climate change. Communication efforts are intended to influence stakeholders and target audiences to support MassBays' objectives, which in turn will allow MassBays to meet the requirements set forth for NEPs within the Clean Water Act. Each target audience has different needs, issues and/or interests which require special messages delivered through various communications channels.

Internal Stakeholders/Audiences

- Management Committee
- Regional Service Providers and Coordinators
- US EPA
- CZM/EEA

External Stakeholders

- Municipal leaders and departments
- State and federal lawmakers and agencies
- Academia/Researchers
- Environmental advocacy organizations & NGOs
- Current and new funders
- General Public
    - Homeowners/renters
    - Developers
    - Recreationalists
    - Visitors/Tourists
    - Water commuters
    - Students
- Business community and industries
    - The Business Community as an Association
    - Aquaculture
    - Development
    - Fisheries
    - Real estate
    - Technology
- Media

KEY MESSAGES

Key Branding Message

To achieve the goal of increasing awareness of MassBays, we need a Key Branding Message. An overall Key Branding Message shares with its intended audience(s) who/what MassBays is and the value it provides. The General Value Proposition or Key Branding Message should clearly and concisely answer the question: **Who/What is MassBays?**

With an area encompassing more than 1,000 miles of coastline and 50 distinct communities, MassBays is unique from many of its NEP counterparts. Recognizing the diversity of the MassBays area, MassBays has employed a ground-up organizational model that relies on five regional coordinators and a small Boston-based central office. This model allows MassBays to most effectively achieve its goals for the entire area while still meeting the unique geographic needs of the various regions.

At the same time, the diversity of the regions and the de-centralized work model creates challenges when it comes to effectively branding and communicating what MassBays is and what the organization's value is. Based on conversations with each of the five regional coordinators, articulating the value of MassBays to their individual constituents can prove challenging depending on the audience and the discussion.

We will address some of these challenges in later sections of this plan and recommended ways to successfully address them.

Based on discussions with the MassBays staff, regional coordinators, Management Committee members and EPA Region 1 staff, it is evident that MassBays' chief value-add is as a ***convener and collaborator*** around issues of coastal habitat protection and restoration. Given its support by both the federal government (as funder) and state government (as host), MassBays is uniquely positioned to reach decision-makers at the highest levels. In addition, the de-centralized, regional organizational model of MassBays allows for more targeted outreach to local decision makers. While there are any number of federal, state and local agencies, non-profits and organizations that work on coastal habitat protection, the mission, model and mandate of MassBays makes it uniquely positioned to bring these various partners together to support and execute on protection and restoration efforts. Through education, data-sharing, grant-making, research and technical assistance, MassBays can be a primary resource for and an important influence on key decision makers.

Thanks to the broad makeup and guidance of the Management Committee, MassBays is also fortunate to have many key individuals and organizations represented as part of its organization. By engaging the Management Committee in implementation of MassBays' CCMP, MassBays stands alone in its ability to help ensure that the relevant and necessary organizations, authorities and decision-makers are working collaboratively to meet the stated goals.

To better reflect its General Value Proposition, as a starting point, Pacer Strategies recommends modest changes to MassBays' organizational name and its mission statement.

Current Organizational Name: Massachusetts Bays National Estuary Program

Proposed Organizational Name: Massachusetts Bays National Estuary Partnership

Current Mission Statement: The Massachusetts Bays National Estuary Program is dedicated to protecting, restoring, and enhancing the estuarine ecosystems of Ipswich Bay, Massachusetts Bay, and Cape Cod Bay. We facilitate partnerships to prompt local, state, and federal action and stewardship, by convening stakeholders on the local and regional level, providing scientific basis for management decisions, and working with decision makers to identify problems and solutions.

Proposed Mission Statement: MassBays National Estuary Partnership is dedicated to protecting, restoring, and enhancing Massachusetts coastal habitats. Working collaboratively with local, state and federal agencies and organizations, MassBays provides funding and technical support across 1,000 miles of coastline in 50 communities.

This name and mission statement and accompanying logo should be on nearly every single document, presentation, written or electronic communication and signage that is affiliated with MassBays. This includes information distributed by MassBays Central Office as well as that of the regional partners. All other past mission statements should be removed from materials.

Unique Value Proposition Messages

Once it is clear to the target audience who and what MassBays is, it is important to deliver messaging that answers the second key question: **Why is MassBays important to me?**

For each audience, we need to deliver a uniquely-tailored message – an answer – that responds to their cares and concerns.

As part of its mission, MassBays provides research assistance, technical support and grant-making to partners to fulfill its mission of protecting, enhancing and restoring our coastal resources. To accomplish its work, MassBays has a multitude of stakeholders who share unique perspectives and are driven by different goals and outcomes.

MassBays has both internal and external critical audiences.

Key Messages for Internal Audiences

MassBays' internal audiences include the following:

- The Management Committee

- EPA
- Regional Service Providers and Coordinators
- CZM/EEA

MassBays internal audiences are both the receiver of information as well as MassBays messengers. It is important that the internal stakeholders understand the goals, challenges and successes of the organization.

First and foremost, CZM/EEA, the Management Committee, EPA and regional partners should all know and support the MassBays mission statement. They should understand the General Value Proposition and Key Branding Message.

The regional coordinators are most often associated with their host organizations. While that is important in its own right, it's critical to the awareness-building effort of MassBays that the RCs are seen as part of MassBays. To achieve this goal, it is important that MassBays Central Office regularly shares information with these key audiences that can then in turn be shared with their unique stakeholder groups. RCs should receive regular (weekly, bi-weekly or monthly) updates on happenings from the Central Office, from each other and from other key partners. As a convener and collaborator, MassBays should be seen as the ultimate source of information on efforts related to the CCMP, grant opportunities, best practices and other coastal habitat-related news.

To execute on this goal, the RCs must also regularly share news and information from their regions with the Central Office in a formal, rather than ad-hoc, way so that they may be shared with other key audiences and stakeholders.

The regional service providers and Management Committee, in particular, are the key messengers for MassBays. They should see themselves and their organizations as integral to MassBays mission.

The internal audience (RCs and Management Committee) are unique in that they are both the receiver of MassBays' message as well as the deliverer. The messages below are intended to be the key messages that each of these groups use with their own stakeholders to explain their role with the MassBays organization and the value MassBays provides.

KEY MESSAGE 1: MassBays National Estuary Partnership is dedicated to protecting, restoring, and enhancing the Massachusetts coastal habitats. Working collaboratively with local, state and federal agencies and organizations, we provide funding and technical support across 1,000 miles of coastline in 50 communities.

KEY MESSAGE 2 (For Regional Coordinators): MassBays supports the work we do on the ground in this region by bringing together interested stakeholders and providing funding, technical support and hands-on assistance. For example: [Each regional service provider should have 3 specific projects they can point to that were made possible through MassBays support]

KEY MESSAGE 3 (For Management Committee Members): As a member of the MassBays Management Committee, our organization provides a forum for discussion about the critical issues affecting our coastal habitat. MassBays is dedicated to bringing together environmental and resource management agencies, nonprofit environmental groups, academic institutions, business interests, government agencies and other stakeholders to ensure the most coordinated and comprehensive approach to the protection, restoration and promotion of Massachusetts' coastal habitat.

Key Messages for External Audiences

Municipal Governments

Successful implementation of the CCMP is predicated on local solutions to environmental challenges. The unique organizational structure of MassBays allows us to offer targeted technical assistance and hands on support to local communities.

In targeting municipal audiences - including municipal Boards of Health, Conservation Commissions, Planning Boards, Boards of Selectman, Public Works departments, Shellfish Constables and other key implementing agencies, MassBays should focus on the local and regional nature of the organization and on the value of the resources it provides – both technical assistance and funding opportunities.

KEY MESSAGE: MassBays' mission is to protect, restore and enhance our coastal habitats. We take a regional approach to our work. Supported by the EPA, we are a resource for local communities and provide assistance as municipalities undertake projects with significant environmental impacts. We have dedicated resources in each region of the MassBays planning area to help communities with things like project development, stormwater remediation design, plan review, permitting assistance, technical evaluations, planning, GIS support, and environmental analyses. We also support innovative approaches to coastal habitat protection by providing grant funding to communities each year.

State and Federal Lawmakers

State and federal policymakers are another key audience for MassBays and the successful implementation of the CCMP. Much like the messaging for municipal partners, state and federal policymakers and agencies should understand the unique value MassBays provides in its mission to protect, restore and enhance coastal habitat. This can help MassBays secure additional support and funding to carry out its mission.

By providing an informal, non-regulatory forum for agencies to share and receive information, MassBays can help government agencies improve their efficiency and make better-informed decisions that consider the environmental impacts of their work.

KEY MESSAGE: MassBays' mission is to protect, restore and enhance our coastal habitats. We take a regional approach to our work. We are supported by EPA and provide assistance to communities undertaking projects with significant environmental

impacts. We have dedicated resources in each region of the MassBays planning area to help communities with things like project development, stormwater remediation design, plan review, permitting assistance, technical evaluations, planning, GIS support, and environmental analyses. We also support innovative approaches to coastal habitat protection by providing grant funding to communities each year.

Academia/Researchers

Given the many partners and stakeholders around the MassBays table, particularly through its Management Committee, MassBays can be a valuable partner to environmental researchers and academic institutions.

KEY MESSAGE: MassBays works collaboratively with local, state and federal policymakers to protect, restore and enhance our coastal habitats. Given our mission, our structure and our reach, we can help turn your research into action. We connect the decision makers with the science to help them make well-informed decisions that impact our coastal environment. In addition, MassBays supports research through grant funding opportunities.

Environmental Advocacy Organizations & NGOs

As noted in the CCMP, cross-agency and cross-discipline communication and collaboration can be challenging. Many local, state and national organizations work in their own ways to protect and enhance our coastal habitats. By better coordinating these groups, MassBays can help ensure that resources and information are shared to produce positive, measurable outcomes. MassBays should position itself as a convener and collaborator with this audience rather than a competitor.

KEY MESSAGE: MassBays works collaboratively with local, state and federal policymakers to protect, restore and enhance our coastal habitats. Given our mission, our structure and our reach, we help bring together like-minded organizations to share research, resources and best practices. Given the makeup of our Management Committee that guides our work, we can help connect organizations with leading decision makers.

Current and new funders

We believe that funders are most likely to fund specific initiatives and projects that align with their giving policies. Therefore, MassBays should promote the innovative work it does in each region of the state and stress the regional collaboration that occurs.

KEY MESSAGE: MassBays is an incubator for great ideas. We generate locally-based models for addressing environmental challenges and work with our regional partners to replicate success region-wide. Our work is guided by a diverse Management Committee made up of individuals representing environmental and resource management agencies, nonprofit environmental groups, academic institutions, business interests, and other important stakeholders. We connect science to action to produce desirable outcomes that contribute to the protection, restoration and enhancement of our coastal

habitat. We are supported by the EPA and reach a large, diverse area where projects reflect the local priorities of five unique regions.

Business Community

The business communities within the MassBays planning area are a key constituency. Whether its resiliency efforts or success of coastal-dependent businesses, business leaders have a vested interest in the protection of coastal habitat. As such, local and regional businesses, Chambers of Commerce and other similar business organizations should be aware of and engaged with MassBays.

KEY MESSAGE: The work we do at MassBays directly impacts your businesses, your employees and your customers. We work with a broad coalition of stakeholders including environmental agencies and non-profits, municipalities, researchers and others to protect, restore and enhance the coastal habitat of our region. Working with our many partners and through our regional coordinators, we can help you and your businesses plan for things like climate change, environmentally smart development and sustainable business solutions.

For Business Associations: An association like a Chamber of Commerce or local Economic Development Group should understand that MassBays can help their members both individually through information sharing and grant-making but also through the work it does to improve resiliency efforts and local climate change impact mitigation that help the business community at large.

Individual Industries: Industries dependent on coastal resources should understand that MassBays is a partner in promoting and supporting the work they do. Fishing and tourism, in particular are two key industries that rely on the continued protection of coastal habitat. In addition, technology companies with products related to waterways could benefit from MassBays' broad network to test and implement their technology.

General Public

Raising the public's awareness of MassBays can help create allies and supporters of MassBays work and help influence decision makers. The general public here includes the following:

- Homeowners/renters
- Recreationalists
- Visitors/Tourists
- Water commuters
- Students & educators

With this key audience, MassBays should focus on highlighting projects that serve to benefit the community. Knowing that projects are prioritized at the local and regional level can help make the general public more invested in the work and outcomes. Estuaries are a treasure for local communities, offering recreational activities, water activities, transportation, access to shellfish and other opportunities. Climate change, in

particular, is an issue that most people are aware of and a good opportunity to introduce the work that MassBays does.

KEY MESSAGE: MassBays, funded through your federal tax dollars, is working hand-in-hand with decision makers in your community to protect, restore and enhance coastal habitat. We're working to fight the local impact of climate change, which threatens our homes, our food supply, our transportation system and the recreational opportunities we enjoy. We are partners in protecting your communities today and for the future.

THE MESSAGING TOOLBOX

To most effectively deliver its message to its intended audiences, MassBays should employ a mix of traditional and digital tactics.

Below are tools Pacer Strategies recommends for MassBays to raise its profile, deliver its messages and attract new partners.

Website

The MassBays website should tell a story. It is a critical tool for raising awareness of the organization and allows MassBays to put its best face forward. The site is a primary resource for information and education and will likely deliver the first impression many of your target audiences have of the organization.

When we look at the website as a tool for delivering MassBays' messages, we consider how well it adheres to the following principles:

- Appearance
- Content
- Functionality/Usability

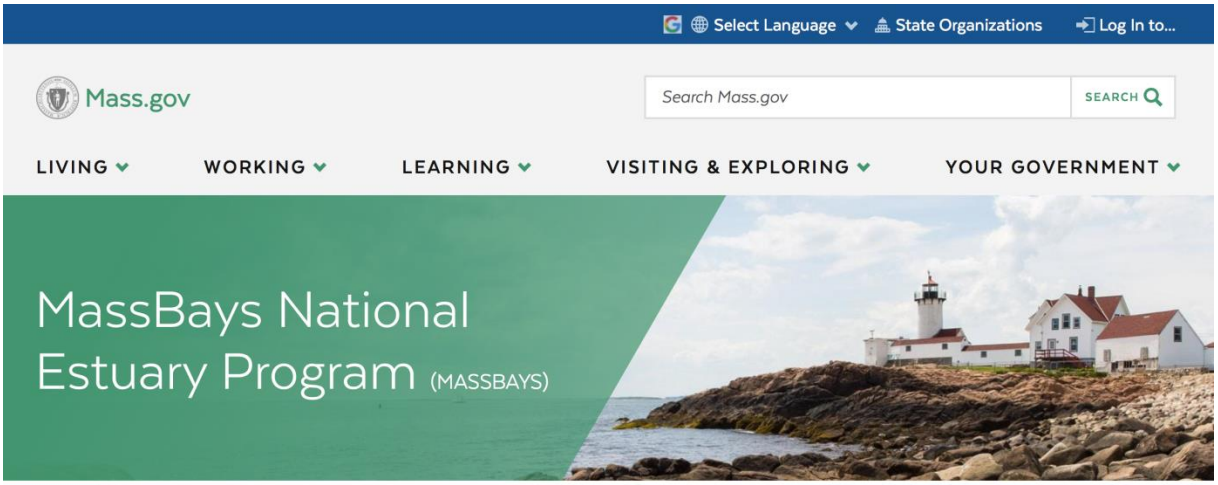
1. Appearance: You have one chance to make a first impression, right? Therefore, you want your website to be visually appealing, engaging and informative. An effective website should grab the eye, use meaningful images and be simple and easy to read.

Analysis: MassBays' current website contains a lot of great information, but is text-heavy, visually unappealing and difficult to navigate. The logo, which should appear prominently on the homepage, is small and haphazardly placed to the right side. When a user lands on the homepage, the first thing s/he finds is contact information for staff rather than a description and images that convey what MassBays is and does. Given that its mission is to protect and restore our estuaries and coastal habitat, it is natural that the homepage would feature pictures of those resources. However, the current site lacks high-quality, relevant photos, and simple, easy to understand description of what MassBays is. While the mission statement is included on the homepage, visually, it blends in with the rest of the text on the page and can be easily overlooked by a user.

Furthermore, the MassBays site is tied up in the structure of the Mass.gov portal. To the average user, MassBays appears to be a sort of state agency, which it is not. Because of that, MassBays' identity and brand is unclear to the user.

MassBays Homepage

Lacks prominent logo, lacks eye-catching imagery, mission statement gets lost among the page, top tabs are not relevant to the organization.



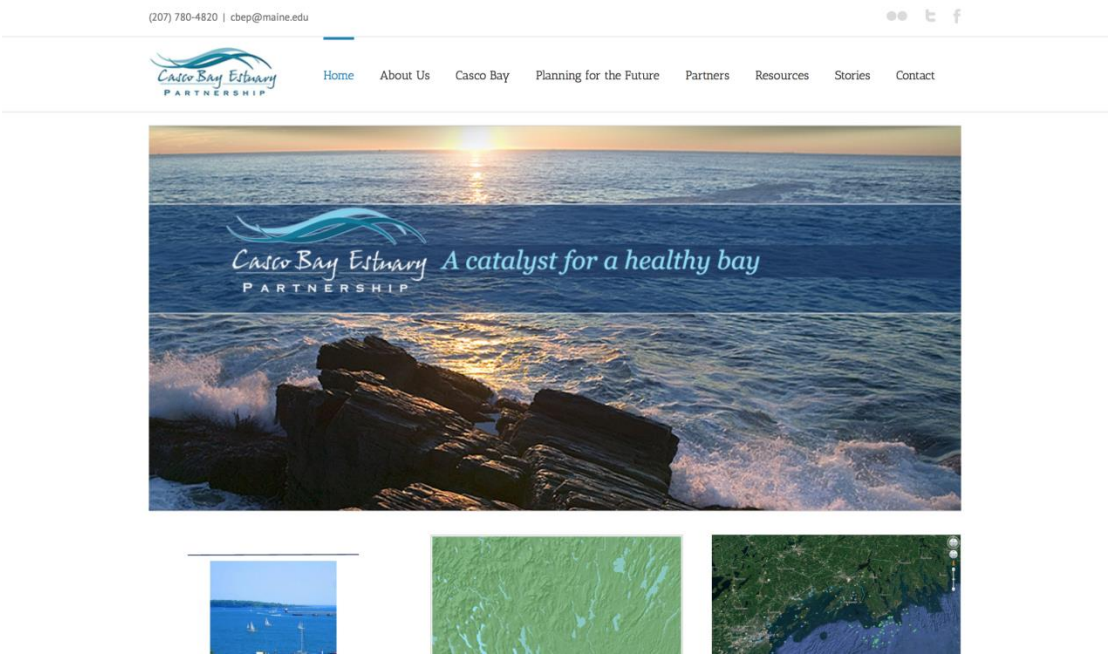
Examples of sites that successfully adhere to the appearance principles:

San Francisco Estuary Partnership

Prominent logo, visually appealing with appropriate imagery to convey what the partnership cares about, menu tabs that explain further the work of the organization.

Casco Bay Estuary Partnership

Prominent logo, visually appealing with appropriate imagery to convey what the partnership cares about, menu tabs that explain further the work of the organization.



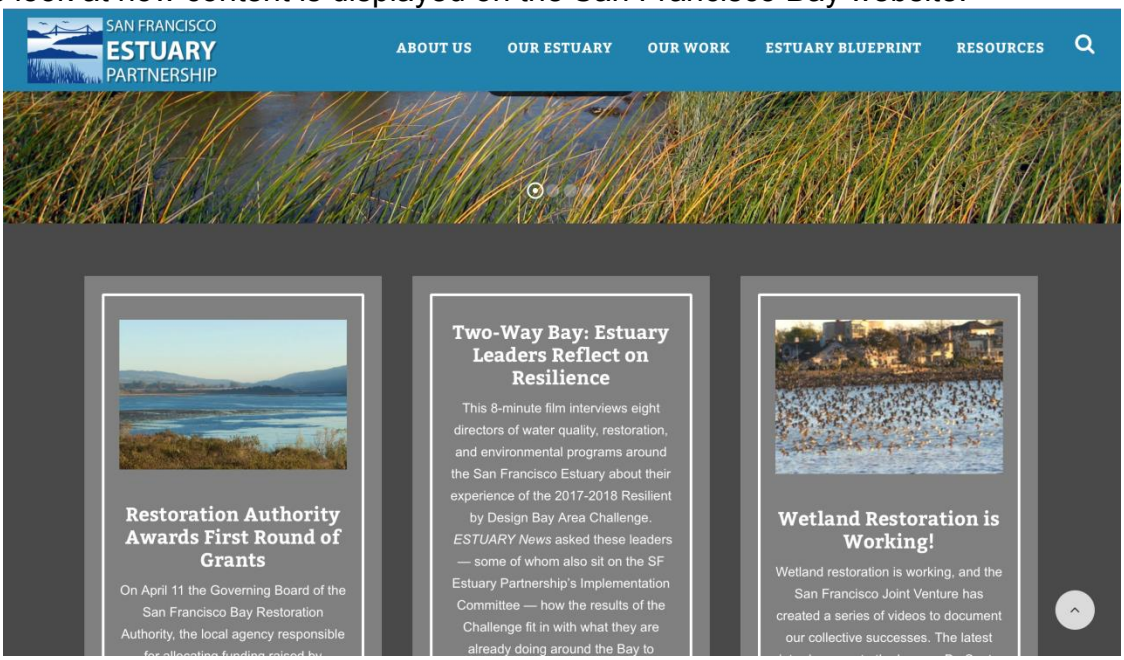
When we look at the sites from San Francisco and Casco Bay, we see that they share common characteristics:

- Beautiful, eye-catching images
- Prominent logo
- Menu tabs with relevant information
- Easy to read, simple text
- Rule of 3rds – both sites use an image that takes up ~ 2/3 of the homepage screen

2. Content: Your website tells your story. Website content should be clearly labeled and should be clear, concise and compelling. A text-heavy site can bore the reader – the more you can incorporate images, the easier it will be to hold a user's attention. Content should be up-to-date with significant news and announcements front and center.

Analysis: MassBays' current site contains a lot of relevant and important information. However, the content is displayed in such a way that it is difficult for the end user to find what s/he is looking for. Links are stacked one on top of the other in no discernable order, requiring the user to scroll (which, especially on a mobile platform, can be a turn off for users). Additionally, information does not appear on the site in a way that tells a story. For example, the leading information on the current homepage is staff contact information. A reader must scroll down nearly to the bottom of the website in order to learn that MassBays has recently awarded $110,000 to partners through the Healthy Estuaries Grant – a key program that MassBays offers and could help create new partnerships. (Also note that the accompanying photo of the State House is not the most effective or engaging image).

Let's look at how content is displayed on the San Francisco Bay website:



- Menu tabs are clearly marked for users to access the information they are seeking
- The three main news tabs in the center of the page tell the story of what SF Bays is working on. The information is presented in a visually appealing way and highlight SF Bay's success. Headlines are clear and concise, and images are relevant to the text.

3. Functionality/Usability: Does your website work? Broken links, out-of-date information, and unrelated information and tools will leave your user confused and frustrated and is likely to prompt them to leave the site. In a nutshell, everything on the site should work, and everything a user clicks should keep them engaged with MassBays.

Analysis: While MassBays' site generally meets the functionality standards, there are areas for improvement:

- Several links on the MassBays site that take users to a page that says "under development."
- The site map section explains to users that a new website process began in 2017 – well over a year ago.
- "Submit a proposal" is not a live link.
- The search box at the top right side of the page allows a user to search Mass.gov but not MassBays specifically, resulting in the generation of information that may be useless to your user

- The “contact form” is a useful tool for MassBays only if someone on staff receives the information submitted and uses it to improve the user experience. Otherwise, users who submit information but receive no response will likely be left with a poor impression of the organization.

These are just a few examples of the limited functionality of the current site. Anything displayed on the MassBays website should be complete (versus under development) or it is best to leave it off entirely. Information that is not relevant to MassBays or its partners should be left off the website.

Website Recommendation: MassBays is limited by the inflexibility of the current mass.gov platform. Pacer Strategies recommends that MassBays migrate off the system to its own web platform. Platforms like WordPress and Squarespace allow organizations to display their information in user-friendly, visually appealing ways that are intuitive and easy for staff or contractors to maintain. Given that MassBays is not a state agency, it should not be constrained by mass.gov’s limitations. Buzzards Bay Estuary Program, for example, has its own website managed outside of the mass.gov system. At least one state agency, MassDOT, also controls its own site.

On its own platform, MassBays could increase its use of images (including those of its staff and regional coordinators in addition to photos of coastal habitat), highlight the work of its regional partners, include video, and integrate social media among other features.

Finally, moving from the mass.gov portal would allow MassBays to address several concerns raised by EPA, including demonstrated autonomy from state government and better display of MassBays’ successes and achievements.

Regional Coordinators’ Websites

Every regional coordinator’s host organization should be required as a condition of the partnership to prominently include MassBays’ logo, link to MassBays website, and a consistent way to talk about the partnership between the host organizations and MassBays.

Social Media

“Content is fire and social media is gasoline.” – Jay Baer, President, Convince & Convert

Among the most important tools MassBays should have in its toolbox to disseminate its messages and share its information are dedicated social media channels including **Facebook**, **Twitter** and **Instagram**. Other platforms like YouTube and blogs may also be relevant but the three specific channels are a good place to start. In particular, they are each a good way to build awareness of the organization, make connections to key audiences, create and develop relationships, increase public support and identify potential donors.

A 2017 Pew Research Center survey[53] found that two-thirds of American adults get their news from social media platforms like Facebook, Twitter and YouTube. In our current environment, as more Americans become concerned with the impacts of climate change and other environmental challenges and protection efforts, MassBays should share its voice, its expertise and its work with those who engage in this type of public conversation. MassBays can either be present on social media or it can risk being ignored and unheard.

Analysis: MassBays currently lacks active and engaging social media platforms, creating not only a challenge to awareness-raising and information-sharing efforts but also creating the appearance that MassBays is an organization that has fallen behind the times.

While MassBays has a reserved Twitter account, it's bio lacks the organization's mission statement and relevant information. The account has just 4 tweets and 15 followers. It fails to project a sense of authority and expertise and risks projecting a poor image of the organization. Pacer Strategies recommends deactivating the current account until a decision has been made to actively use Twitter as a tool. If the Twitter reactivation occurs more than 30 days after the account is deleted, MassBays will have to create a new account. If the handle @MassBays is no longer available, we recommend using the handle @MassBaysNEP MassBays has no other social media channels.

On a positive note, some of the Regional Coordinators' host organizations have social media platforms that could be used to help disseminate and amplify messages, campaigns and relevant MassBays news.

Social Media Recommendation: MassBays should create and maintain dedicated social media channels including Facebook, Twitter and Instagram. These channels should each be branded with the MassBays logo and mission statement, should be image-rich, and should be maintained and updated with new content on a regular basis (at least once a week for Facebook and Instagram, daily for Twitter). MassBays should have one staff member dedicated to maintaining the social media channels and should require its regional coordinators to contribute on a regular basis to content. Social media platforms should not be one way-streets. In addition to posting content, the dedicated staff member should take the time to engage with followers who comment on MassBays content, ask questions or offer ideas.

How do you use social media to deliver your messages and strengthen your connections with key audiences? Below, we look at several ways to do just that.

[53] https://www.reuters.com/article/us-usa-internet-socialmedia/two-thirds-of-american-adults-get-news-from-social-media-survey-idUSKCN1BJ2A8

Social Media to Raise Awareness

Social media is just that – social. It means you are connecting with audiences in a give-and-take sharing of information. When content is interesting, visually appealing and easy to understand, you are likely to engage more followers in your conversation.

According to Sprout Social, 97 percent of adults between 16-64 say they logged on to at least one social media platform in the last month.[54] Because so many of your target audiences are likely to be active on at least one social media channel, it's important to create and disseminate content across all platforms.

Here are a few ways to raise awareness of MassBays via social media:

- Create compelling content – MassBays and its partners have a wealth of information and data to share. Pulling out key information in current reports, sharing data visually with maps and infographics and Did You Know campaigns can give your growing audience a sense of who MassBays is and what it does. Regional coordinators should be required to provide easily postable content about what's going on in their regions on a regular basis to help populate the platforms.

- Make content visually appealing – This goes hand –in-hand with creating compelling content. The very mission of MassBays lends itself to creating beautiful and engaging images of coastal habitat, wildlife and the impacts of climate change. People are more likely to "like" and "share" your content – and remember the information – when included with an image.
    - A great example of this is the King Tides. Without images, the King Tides are interesting, but with images, people can see directly the impact these tides have on surrounding land, homes and familiar places.

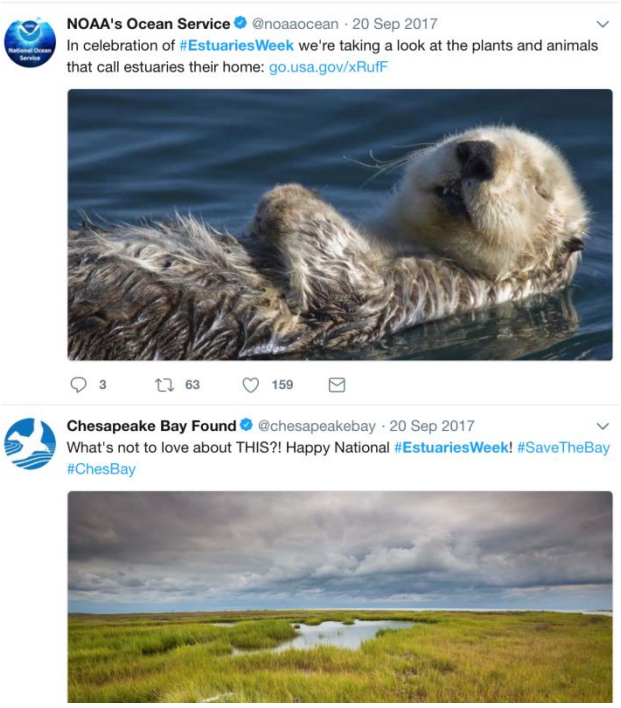
    - Videos – videos can be a great way to show off the work in the field that reginal coordinators are doing. When people can see the resources MassBays is working to protect, the work is no longer abstract.

- Connect with followers who share similar interests. To start growing your audience, connect with other users who share an interest in the work MassBays does. Start by connecting with MassBays' Regional Coordinator organizations and Management Committee members. Follow and like statewide environmental groups, local towns, state and federal lawmakers, tech companies, fishing industry groups, business associations and the like. Often times followers will return the favor by following you back, growing your audience and spreading

[54] https://sproutsocial.com/insights/social-media-statistics/

your reach. Ask your audience to share your content on their own platforms. Over time, you'll grow your reach and increase MassBays' visibility.

- <u>Create and Join Mini Social Campaigns:</u> Creating or participating in week-long or month-long campaigns around a specific topic is a great way to boost your presence. You can schedule these campaigns around holidays, key dates or "designated weeks." In September, for example, we celebrate Estuaries Week. MassBays should join in the campaign by posting images and facts relevant to Massachusetts estuaries. Using the hashtag #**EstuariesWeek**, MassBays can raise its awareness among users interested in learning more about the topic and can connect with potential new partners.



MassBays could also launch its own campaigns, encouraging the general public and partners to **share photos** of their favorites places in the MassBays area. Encouraging people to submit photos and a description of why they love that particular spot engages your audiences and helps create a connection to MassBays.

MassBays could also control the content of a campaign while highlighting a certain issue. For example, MassBays could do a week-long **#Invaders** campaign, raising awareness of invasive species in our estuaries and what MassBays is doing to fight invasive species. Regional coordinators should promote the campaign on their own social media platforms to maximize reach.

Using Social Media to Build Partnerships

Because MassBays views itself as a convener and facilitator of partnerships, one of the best ways it can use social media is to create and strengthen key connections. MassBays should build into a social media strategy a plan for cross-promoting its partners. Promoting organizations and individuals who are targets for *new* partnerships is an important part of that strategy.

Cross promoting means giving "likes" to other organizations' content, reposting relevant posts, promoting each other's events, sharing news and tools from each other's sites,

and recognizing and boosting each other's work. This allows MassBays to create and strengthen relationships with target audiences including environmental advocacy organizations and NGO, researchers and academic institutions, and decision makers while expanding its influence on social media.

There are natural social media partnerships for MassBays to pursue including the Regional Coordinators, grantees, environmental organizations with a focus on clean water, schools, marine-based businesses and more.

Other Digital Communications Tools

In addition to an updated website and social media, there are other electronic tools MassBays can use to reach its intended audiences and help achieve its goals.

Email Branding: While email's primary purpose is to send and receive information, it should also be considered a marketing and branding tool. Pacer Strategies recommends that every MassBays staffer and regional coordinator include in their email signature the MassBays logo, website link and link to MassBays' social media.

Digital Digest: One of the goals laid out in the CCMP is to position MassBays as a primary source of information about conditions and trends of coastal habitat across the MassBays region. To be seen as a primary source, MassBays should send regular (weekly if possible) email communications to its network in the form of an easy to read digital digest. Similar to the quarterly MassBays newsletter, it could contain up-to-date links to upcoming events, a few news items and relevant news articles. Short summaries with links are likely to be the best format to engage readers.

Online CCMP Scorecard: To engage your audiences in the CCMP, Pacer Strategies recommends creating an online scorecard that gives stakeholders a regular update on progress.

Updated Downloadable FAQ (frequently asked questions) sheets: There are a number of great reference documents on MassBays current website but they are difficult to find and some are a few years out of date. Pacer Strategies recommends broadening the available reference materials to include updated downloadable MassBays fact sheets for use and distribution by Regional Coordinators, Management Committee members and external audiences who want to learn more or share information about the kind of work MassBays does. These fact sheets should be front and center on the MassBays website under a "Resources" or "Facts and Information" tab.

Fact sheets may include:

- The MassBays Story – basic info about MassBays and highlights of its successes
- Issue Briefs covering areas like Stormwater Management; Climate Change Resilience
- 5 Things You Can Do To Protect Your Estuaries
- All About Invasive Species

- Updated Stormwater Management Guide and other helpful guides for Municipal Officials

Videos: MassBays work is well-suited for images, whether it's photos or videos. MassBays should develop a series of short (2-5 mins) videos that can be featured on the website and shared with audiences and potential funders to better demonstrate the work MassBays does. For example, MassBays could produce a video showing an audience what eelgrass is, what problems result when eelgrass is lost, and how eelgrass is restored.
Grantees could also be asked to produce videos as part of their application process or as part of the contract to highlight the kinds of partnerships MassBays supports.

Web-Based Events Calendar
MassBays should host on its website a calendar of events occurring across the MassBays region. This calendar can be populated monthly by MassBays staff, regional coordinators and partners. Events do not need to be MassBays-sponsored but should be relevant to MassBays' mission.

Hack-a-thon Events
MassBays could partner with universities, students and researchers to host day-long hack-a-thon events using MassBays data. By sharing this data with "hackers," MassBays could create new apps, visualization and interesting tools for sharing its data with wider and relevant audiences.

Non-Digital Tools
In addition to the electronic tools above, MassBays should also target its audience through in-person events, press outreach and branding.

Press materials
Press releases and media kits allow reporters and editors to become familiar with MassBays as a resource for information about our estuaries and coastal habitat. All materials should be branded with the MassBays logo on MassBays-specific letterhead and should include boilerplate language that includes MassBays' mission. Press releases should be prominently featured on the MassBays website so that members of the media can easily access new and recent announcements.

Analysis: On the current MassBays website, news and announcements are located towards the bottom of the website, making them easily overlooked. The current press release looks to have come from the Executive Office of Energy and Environmental Affairs and the Office of Coastal Zone Management rather than MassBays. In addition, the media contact is a non-MassBays employee and there is no boilerplate description of what MassBays is. While a press release from the Governor's office may garner attention and raise awareness of the substance of the announcement, it presents a missed opportunity to raise awareness of MassBays and the work it does.

Based on conversations with MassBays staff, it is also apparent that MassBays, despite the fact that it is not funded by state government, is required to follow the media protocol of the current Administration. This protocol includes several layers of sign off and can result in the delayed release of timely information.

Recommendation: MassBays should be responsible for distributing its own press releases and announcements, and they should include contact information for a MassBays employee. Further, press releases should be printed on MassBays letterhead with MassBays boilerplate.

Regional coordinators should also be required to use MassBays boilerplate and letterhead when making MassBays-relevant announcements and include a quote from the MassBays Executive Director.

Finally, MassBays should create and maintain its own media database that includes contact information for local reporters across the entire MassBays region. By engaging those reporters, MassBays can position itself as a primary source of information on issues affecting the coastline.

Events

Tours for Media, Local Elected Officials, Students and the Public

One way to make the work MassBays does relevant and tangible to target audiences is to bring those audiences out in to the field. MassBays Regional Coordinators should host regular educational tours (monthly during good weather, for example) aimed at educating the media, the public and state and local elected officials about the estuaries and watersheds. These could be lunch-time tours on a boat, evening tours and info sessions with a BYO picnic dinner or tours centered around specific initiatives taking place in each of the regions.

Bring the Bays to the People

To reach community members who may not be naturally inclined to participate in tours, MassBays Central Staff and Regional Coordinators should work together to bring the Bays to the people where they are. Consider touch-tanks at Town Hall or exhibit booths at already-established events like Farmers' Markets, Town Days, Earth Day events and the like. Some of the Regional Coordinators already have hands-on tools they use in schools to educate students about clean water. Bringing those tools to a wider audience can be an effective way to connect people to MassBays' work.

Along the same lines, MassBays should have access to an exhibit booth and materials that could be easily set up at events like business or trade association meetings, municipal association gatherings, and similar events where large members of the general public and decision-makers are likely to gather.

Out of the Box Events

"Pop-Up" events are an increasingly popular way to bring awareness to brands and businesses. MassBays could partner with local business to host pop-ups to help raise

awareness of the MassBays brand while benefiting local businesses? Working with grantees like the Massachusetts Oyster Project, for example, MassBays could host an oyster shucking pop-up.
Based on conversations with Upper North Shore coordinator Peter Phippen, the invasive Green Crab is a culinary treasure just waiting to be discovered. MassBays could partner with a local restaurant on a special Green Crab dish that introduces local residents to the issue of invasive species in a fun and memorable way.

Legislative Briefings

MassBays should both conduct its own annual legislative briefings for state lawmakers and staff as well as testify at legislative hearings where bills relevant to MassBays work are heard. Understanding the limits on direct lobbying, MassBays should use these briefings and hearings as opportunities to highlight ongoing work in the communities served by relevant state lawmakers. Similar educational briefings are regularly hosted at the State House and are most often sponsored by lawmakers from districts impacted by the organization's work or lawmakers from a relevant committee (Joint Committee on Environment, Natural Resources and Agriculture, for example). These briefings could be billed as annual State of the Bays reports.

Public Awareness Campaigns

Much of the work that MassBays does takes place right in the communities where target audiences live and work. Monitoring work and other in-the-field activities and projects should have signage to indicate that the project or ongoing work is supported by MassBays. Pacer Strategies recommends that all projects supported by MassBays include visible signage with MassBays' logo and web address.

Signage templates can be uploaded to MassBays' website and made to be downloadable by the relevant partners. Other NEPs have made similar signage available on their own websites. In addition, many of the regional coordinators host public awareness campaigns that should include MassBays' logo and website on handouts and other publications.

EXAMPLES:

Toolbox wrap-up

Consistent branding and regular communication is key to increasing MassBays' visibility and generating new support for its work. Armed with diverse and creative tools, MassBays should be able to grow its reach and make significant progress toward its goals.

As noted in an earlier section of the Communications Plan, MassBays currently lacks the personnel resources to deliver on a robust communications strategy. To successfully create and execute the messaging toolbox discussed in this section, MassBays will need additional personnel resources. Those resources and recommended metrics for measuring the success of these tools are contained in the third section of the Communications Plan.

MASSBAYS' PARTNERSHIPS

To achieve the goals set forth in the Comprehensive Conservation and Management Plan, MassBays must rely on a wide array of partners. Thanks to its current and ongoing efforts, MassBays already has a good working relationship with numerous stakeholders at the local, state and federal levels, in addition to non-profit partners, funders, researchers and others.

By implementing the messaging strategies discussed earlier in this plan, MassBays can continue to build upon that network, create new and exciting partnerships and potentially generate additional new revenue to deliver additional programming, technical assistance and education about efforts to protect, enhance and restore coastal habitat.

New to the CCMP is a focus on Climate Change and Environmental Justice. With an eye on strengthening MassBays' impact in these areas, we focus on developing new partnerships with like-minded organizations and individuals in these key areas. In addition, because many of these relationships are made and maintained at the regional level, we recommend some additional partnerships for MassBays' central office to explore.

This section outlines broadly the partnerships MassBays should work to develop. With this framework, MassBays could develop a more specific and targeted list in consultation with key members of the Management Committee, Regional Coordinators and staff.

Current decision-makers and internal partners

- Management Committee
- Regional Coordinators
- Municipal officials including planners, conservation commissions, harbormasters, public works departments and similar municipal offices
- State and federal agencies, including CZM

External Partners

- Local and regional environmental organizations including watershed associations, citizens' monitoring groups
- Research institutions and universities
- Healthy Estuaries grantees

Prospective Partners to Target to Help Raise Awareness of MassBays

- **Educators** – MassBays currently has an informal partnership with educators through the New England Ocean Science Education Collaborative. MassBays should explore partnering more directly with NEOSEC members and/or other similar organizations focused on educating the public about oceans, watersheds and coastal habitat.

- **Neighborhood Associations** – In coastal communities, MassBays could partner with Neighborhood Associations to bring greater awareness to the challenges facing coastal habitat and work together to generate educational tools for the community.

- **Issue-Specific Organizations** including Climate Change and Environmental Justice Groups
    - Conservation Law Foundation
    - GreenRoots
    - New England Environmental Justice Foundation
    - Alternatives for Community and Environment
    - Environmental League of Massachusetts

- **Trade Associations**
    - Massachusetts Municipal Association
    - Local Chambers of Commerce or Chamber subcommittees
    - Mass Marine Trades Association
    - Massachusetts Lobstermen's Association
    - Environmental Business Council of New England
    - Massachusetts Harbormasters Association
    - Massachusetts Shellfish Officers Association

- **Funders**
    - Foundations including Barr, Island Foundation (focused on environmental justice)
    - The State – MassBays at one time received state funding, yet today there is no state financial support. While MassBays is housed within a state agency and follows the rules and policies of state agencies, there is no dedicated state funding for the organization. Pacer Strategies strongly recommends that MassBays seek dedicated state funding through the annual budget. There are a number of ways to do this, including an annual earmark for MassBays or a dedicated earmark for regional partners, specifically dedicated to MassBays activities. Because MassBays is currently constrained in its ability to directly request state funding, this would require either a new host for MassBays or approval and cooperation from the Executive Office of Energy and Environmental Affairs. As a state-hosted program, MassBays is constrained it its ability to request state funding. The Management Committee should seek authorization and cooperation from EOEEA to communicate with state and local lawmakers with regard to funding and programming. (See lawmakers section below). Without this support, MassBays should explore host organizations outside of government that will provide the funding and flexibility it needs to be successful over the long-term.

- **Local, State and Federal Lawmakers**
  - Conduct educational briefings at the State House with relevant lawmakers/aides on the work MassBays is doing. These could be done in conjunction with CZM or EOEEA if it would make it easier to organize.
  - Given that MassBays' existence depends on the EPA, it's important that MassBays communicate with federal lawmakers on a regular basis. We recommending providing quarterly updates via email to members of the Congressional Delegation. In addition, MassBays should add the delegation and its key staff to its email lists.
  - While much of the work MassBays does is in partnership with municipal agencies, MassBays should also ensure that the decision makers (i.e., elected leaders) are aware of the work MassBays is doing in their areas. Educational briefings similar to those recommended at the State House could be conducted regionally.

In addition to the partnerships above, we recommend a review of the organizations and individuals included in the original Management Conference convened by MassBays in its early years. The Conference included nearly 300 representatives from federal, state, and local government agencies, regional planning agencies, various user groups, public and private institutions, and the general public. This review creates an opportunity to re-engage former partners and identify new ones.

To properly develop and maintain these relationships will require additional work by MassBays staff and regional coordinators. Therefore, Pacer Strategies recommends MassBays hire a full-time employee or contract worker who can identify specific organizations for partnership, schedule meetings, create and execute events and communicate regularly with all partners.

COMMUNICATIONS RESOURCES & METRICS

Communication Roles
Clearly defined communications roles are essential for the successful delivery of the communication strategy. The communication objectives set out in this strategy will only be achieved if all contributors deliver on their actions.

Current Challenges:

- MassBays' Central Office has just one FTE and one part-time employee to oversee the entirety the work of the sprawling MassBays region. MassBays' current resources are insufficient to deliver on a robust communications strategy.
- While the regional structure of MassBays is intended to ensure a local approach to managing and protecting coastal habitat and communicating with key local stakeholders, the lack of centralization around communications makes it challenging to deliver a clear message about MassBays across the entirety of the region.
- While MassBays is not a state agency, the organization has been instructed to follow the media relations protocols of Coastal Zone Management, which has resulted in delayed responses to media and missed opportunities to promote good work done by MassBays.

Recommendations:

1. Hire a MassBays Communications and Outreach Manager

To deliver fully on this plan, Pacer Strategies recommends MassBays immediately engage a full-time communications and outreach manager. The manager's primary responsibilities would include:

- Executing on the strategies outlined in this communications plan;
- Serving as the primary liaison with regional partners regarding MassBays communications efforts;
- Identifying opportunities for media coverage;
- Responding to media inquiries;
- Proactively communicating with key stakeholders via the tools outlined in the toolbox section and respond to public inquiries;
- Planning and executing workshops, programs, and public events
- Serving alongside the Executive Director as chief spokesperson for MassBays

The communications manager should plan, manage, review and deliver the communications strategy and should take the lead in ensuring MassBays' branding elements are in place on all communications.

The communications manager should final editorial sign-off on all communications (e.g. publications, videos, online material, press material, website and social media) and should be the chief liaison with any outside communications vendors.

PUBLICATIONS /PROMOTIONAL MATERIAL
The communications manager should:

- lead on the production of all publications and promotional material
- primarily create and write content, along with the regional coordinators and MassBays central office
- plan, manage, edit and produce visual and written content and documents
- draft all talking points, public reports and other public materials

DIGITAL
The communications manager should:

- coordinate content and manage website, e-newsletter, videos
- primarily write content, with responsibility for region-specific news to be led by regional coordinators
- maintain, review and regularly update the website
- lead on and manage social media presence

MEDIA
The communications manager should:

- develop and coordinate media plans in coordination with regional partners
- coordinate content and write news releases with input from partners
- serve as point of contact with CZM and EOEEA regarding media activities
- Draft op-eds, letters to the editor, bylined articles

OUTREACH
The communications manager should:

- Serve as a public representative of MassBays at relevant workshops, conferences, legislative briefings and other meetings as appropriate
- Communicate regularly with the MassBays Communications Subcommittee about ongoing communications activities

Short of hiring a Communications and Outreach Manager, MassBays should retain a communications consultant to draft and edit written and digital materials, manage social media and liaise with the Regional Partners, Management Committee and Key Stakeholders to deliver on key parts of the Communications Strategy.

2. Engage a website developer

As discussed earlier in this plan, MassBays should give strong consideration to migrating off the mass.gov web portal and create its own website, maximizing MassBays' ability to share its story. MassBays should immediately engage a web developer who can create a new website for MassBays by early 2019.

3. Create clear information-sharing and communications protocols.

As identified earlier in the plan, one of the main challenges to creating a defined brand for MassBays is the de-centralized model through which MassBays does its work. Based on discussions with Regional Coordinators, there are varying degrees to which announcements and activities are linked to MassBays.

Information Sharing: To help create a more cohesive MassBays brand, Regional Coordinators should share a set number of activities each month that can be promoted through MassBays social media, newsletters, and other communications tactics.

Pacer Strategies also recommends that MassBays central office communicates more formally and regularly (once or twice per month) with the Regional Partners and Management Committee via email updates.

Publications and Press materials
All press releases, reports and other public documents highlighting work carried out with MassBays funding should include the MassBays logo. Drafts should be shared with the Executive Director before dissemination. Management Committee members should always receive a copy of the public materials. Press releases, reports and other public materials prepared by MassBays Central Office should likewise be shared with Regional Partners and Management Committee.

In summary, much of the success of MassBays' communications efforts will depend on clearly defined roles and responsibilities within the organization. Such roles and responsibilities can help ensure timely, accurate dissemination of information and position MassBays to grow its brand.

METRICS

To measure the success of MassBays' communications efforts and make necessary adjustments, MassBays must put in place metrics for measurement.

While there are recommended targets for each measurement category below, Pacer Strategies recommends identifying a current baseline for each measurement tool first. This is an important task that should be undertaken and completed in Year 1. The Communications Manager should an analysis of current measurements including website statistics, reciprocal links, media coverage, email opens and engagement,

newsletter audiences and engagements. Social media baselines should be established at the end of Year 1 as MassBays does not currently use social media channels.

Below are the measurements and specific targets. Targets may be adjusted based on current baselines, and should be revisited annually to maintain a robust communications effort.

Communication objectives	Measures	Targets
Broaden awareness of MassBays and its programs	• **Website statistics** including number of visits and then how visitors behave once on the website • **Social Media statistics** including numbers of new followers and the reach of messages • Number of **reciprocal links** on appropriate websites • **Media Coverage** • **Email** open and click rate	• Increase number of website visitors by 50 percent each year of the CCMP • Grow Facebook, Twitter and Instagram followers by 10 percent each year of the CCMP • 5 new reciprocal links per year • 3 press releases per year, picked up by news outlets • 2-5 percent increase in email open rate per year
Highlight scientific research, monitoring and management needs across the planning area.	• Number of stakeholders at workshops/conferences • Number of stakeholders signed up to receive e-newsletters • E-newsletter statistics -open rate, click through, forwards	• Increase by 10 percent the attendees at workshops and conferences each year of the CCMP • Increase by 5-10 percent the number of stakeholders signed up to receive newsletters • Increase by 2-5 percent the open rate of e-newsletters • Increase by 20 percent the number of Healthy Estuaries grant applications received

	• Number of grant applications received • Dissemination of best practice tools, guides and other published materials • Number of decision makers and stakeholders MassBays collaborates with *define successful collaboration	• Meet with 3-5 new stakeholder groups/decision makers throughout the entire MassBays region each year • MassBays-created materials cited or referenced by an increased number of stakeholders
Invite current and new partners to participate actively in implementing the CCMP	• Number of local decision makers engaged in meetings and discussions re: CCMP • Public participation • Number of funders • Leverage reported to EPA via NEPORT	• Increase by 2 per year the number of new local decision makers, state elected officials or federal agencies reached by MassBays in each region • Increase by 3 per year the number of public organizations that partner with MassBays *define successful partnership • Increase by 1-2 per year the number of new funding partners • Increase by 25 percent the amount of funding support from current funders. • Increase by 10 percent the leverage reported to EPA

COMMUNICATIONS SEQUENCING

There are many components of this plan that will take time and resources. In light of that, Pacer Strategies recommends MassBays sequence some of the communications efforts in the first year(s) of the CCMP.

January – June, 2019

- Retain communications consultant

- Begin hiring process for communications manager
- Engage a website developer
- Update all materials with logo and mission statement
- Create and begin using social media channels
- Update email newsletters
- Introductory outreach to new partners
- Plan for upcoming workshops

June – December, 2019

- Onboard communications manager
- Launch one new public awareness campaign
- Introductory meetings with policymakers
- Host workshops with focus on engaging new and returning partners

CONCLUSION

The work MassBays is undertaking to protect our oceans and coastal habitat is vital to the future of Massachusetts and all who live and work here. It's important to make the public, policymakers and stakeholders aware of MassBays' efforts and feel connected to its mission.

As MassBays' embarks on the next chapter for the organization and its work, this comprehensive strategic communications plan should guide its communications and outreach efforts. MassBays should share its success stories and its critical research with as many of its intended audiences as possible and continually engage with its audiences to help it reach its goals and fulfill its mission.

Communications plans are intended to be flexible and should be regularly adjusted and updated to reflect organizational realities, needs changes and progress. We recommend annual reviews of this plan and periodic updates to ensure it remains a reliable roadmap over the life of the CCMP and MassBays' work.

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Attachment 2. Finance Plan and Recommendations

Report of the MassBays Finance Subcommittee

Subcommittee Members: Colin Van Dyke (Chair), Mark Fine, Andrew Gotlieb, Margherita Pryor, Kristin Uiterwyk, Samantha Woods

Charge:
At the January 10, 2018 MassBays Management Committee meeting, the Management Committee charged the ad hoc Finance Subcommittee with responsibility for carrying out the following:

1. Prepare a draft Fiscal Plan for discussion at the October 2018 Management Committee meeting that specifically addresses options and opportunities for diversified funding, including (1) potential partnership with Restore America's Estuaries, (2) strategies for securing directed state funding, and (3) establishing a affiliated fundraising non-profit. Supporting materials for Finance Subcommittee use include:
    a. EPA Guidance for NEPs regarding components of a fiscal plan (Attachment A).
    b. A 2014 draft Financial Approach prepared by MassBays' Executive Director (Attachment B).
    c. Fiscal plans approved by EPA Region 1 and Headquarters for other NEPs (e.g., Sarasota Bay, Attachment C).
    d. Input from MassBays' EPA Region 1 Coordinator (garnered via calls and meetings).

2. Advise MassBays' Executive Director in responding to comments from the Management Committee (and others as needed) regarding MassBays' Fiscal Plan.
3. Review and approve a final Fiscal Plan to be submitted as an Attachment to MassBays' Comprehensive Conservation and Management Plan by October 2019.

Principles:
1. While the CCMP has been designed to allow for its implementation relying solely on §320 funds; its impact will be greater with additional resources: financial and in-kind support to MassBays directly, or indirectly through MassBays' existing and potential partners.
    a. Example: MassBays has secured funding to support collaborative projects with DMF. In those cases, DMF provides state-funded services and in-kind match for those projects.
2. We must be careful to avoid cannibalizing existing sources of support. (MassBays v. RSPs and MassBays v. other agencies)
3. Further consideration must be given to obtaining increased financial support from the Commonwealth.

Process:
The Subcommittee met via two conference calls and two in-person meetings and provided regular updates to the Management Committee. The Subcommittee reviewed the following, described in more detail in the following sections:
- Funding history
- Federal funding predictability/reliability
- Expenditures history

- Funding options
- Direct funding versus leveraged resources
- Addressing constraints on funding diversification
- Recommendations

Funding History

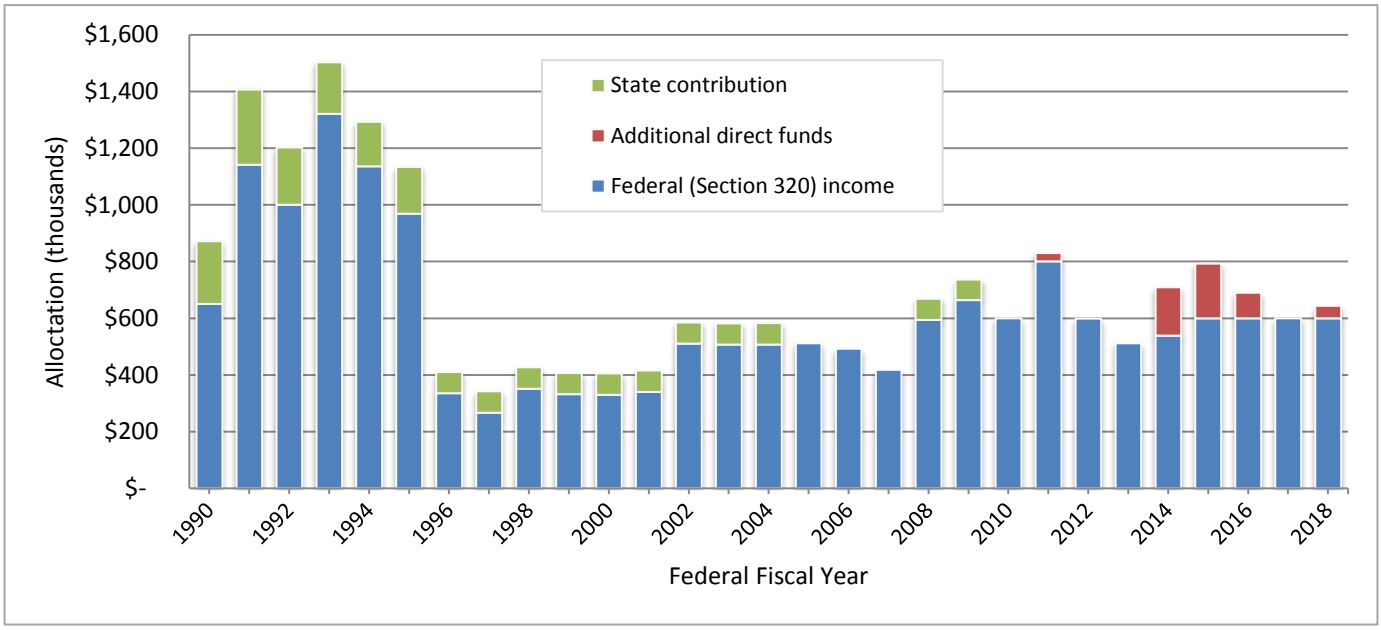
The Massachusetts Bays Program (now the Massachusetts Bays National Estuary Program) was launched in 1988 with $2 million in fees resulting from a lawsuit brought against the state regarding polluted discharges to Boston Harbor. According to the settlement, these funds were to be used "to coordinate and fund projects dedicated to the restoration, protection, and environmental education for Boston Harbor and the Massachusetts Bay." Subsequent legislation (MGL ch. 236, §7 [1988]) directed the $2 million to be spent on:

> projects to restore, protect, and improve the quality of Boston and Lynn harbors and Massachusetts, Buzzards and Cape Cod Bays, to increase understanding of the Bays and their resources and the effect of human activities upon them, and to encourage public involvement in activities which promote the harbors and Bays as living resources and public treasures for present and future citizens of the commonwealth of Massachusetts.

With these funds in hand, the Program led a major scientific research initiative to determine specific pollution problems in Boston Harbor. From 1988 to 1992, MassBays distributed $1.6 million to researchers characterizing the major physical and biological features of Boston Harbor and Cape Cod Bay.

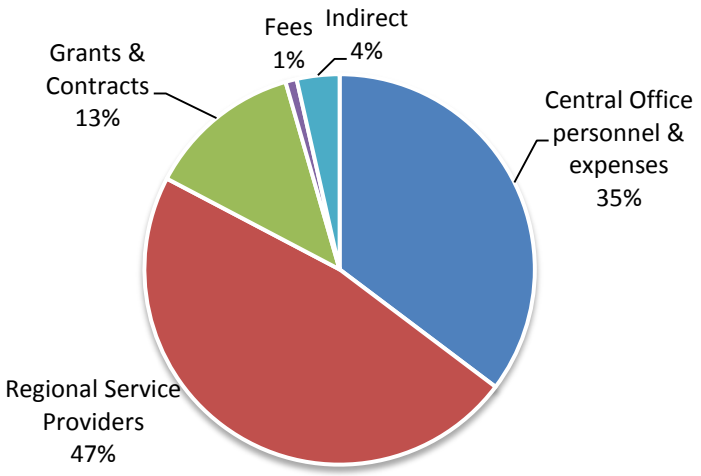
Meanwhile, MassBays applied for and received designation as a National Estuary Program in 1990. As an NEP, MassBays is eligible for funding from EPA under CWA §320. That funding has been relatively consistent since 1990. This is in contrast to state investments, which decreased over time until Federal Fiscal Year 2009 *et seq.*, when no funding was allocated to MassBays in the state budget (Figure 1).

Figure 1. Funding allocations to MassBays, Federal Fiscal Year (FFY) 1990-2018



MassBays' FFY2018 Workplan allocated $643,000 income from EPA in the proportions illustrated in Figure 2 and as described below. This relative spending distribution has remained stable since 2013.

Figure 2. Budgeted expenditures, FFY2018



Salaries and Fringe
MassBays currently employs a full-time Executive Director and part-time (0.6FTE) Staff Scientist. In 2014, MassBays reallocated funding from Central Staff (a part-time [0.8FTE] outreach coordinator/Metro Boston RC) to fund a fifth RSP for the Metro Boston Region.

Regional Service Providers
Yearly grants to Regional Service Providers have varied from a high of $68,207 each in FFY2006 ($54,000 EPA funds, $14,207 state funds) to a low of $59,7500 each in FFY2010; RSPs have each received $61,000/y since 2013.

Grants & Contracts
MassBays established a Research and Planning Grant program in 2011. The Management Committee formed a working group to evaluate the program and relaunched it as the Healthy Estuaries Grant Program in 2016. Between 2013 and 2018, disbursement of funds to municipalities, ngos, and other state agencies (note that state agencies are not eligible for the Healthy Estuaries Grant) totalled $440,150.

Fees/Shared agency expenses
MassBays' annual budget provides up to one percent of the total §320 grant amount to CZM to offset costs of services including program-level fiscal management, computers and phones, day-to-day printing capacity, and internet access. Between 2013 and 2018, MassBays allocated a total of $30,000 to cover these services, which are separate from those included in indirect charges described below.

Indirect Charges
Indirect charges allocate monies directly to the Commonwealth, to support state-level administrative and overhead costs. Each year the Executive Office of Environmental Affairs and the Department of Commerce/NOAA negotiate a rate for indirect charges (applied to salary and contractual line items). Expenses included in calculating yearly rate are partial salaries for the Secretary and his executive staff, as well as the Director of Legislative Affairs, Office of Counsel, Finance and Budget Officers, Human Resources, Information Technology, and Communications/Public Affairs (See Figure 3). The rate has

varied from 11.15% (FFY2018) to 36.27% (FFY2017) with an average of 18.01%. Between 2013 and 2018, EPA has contributed a total of $139,966 to support positions similar to those listed in Figure 3.

Funding options

In 1994, MassBays commissioned a survey of possible means to finance implementation of the first CCMP.[55] The resulting report, *Financing the Massachusetts Bays Program Comprehensive Conservation and Management Plan*, was divided into three sections: Grants, Revenues, and Financing Mechanisms. While many of the suggested financing options included have been phased out or defunded since 1994, relevant suggestions are listed below.

Federal Grants

- EPA funding via DEP, e.g. funding under CWA §604(b) (mitigating nonpoint sources) and §319 (stormwater treatment and management). MassBays' RCs work closely with municipalities to bring those funds to MassBays' planning area. In Federal Fiscal Year 2017, for example, RCs reported on the following assistance to municipalities:

DEP 604b Water Quality grant, MS4 Municipal Assistance Grant (https://www.mass.gov/service-details/grants-financial-assistance-watersheds-water-quality)	Cape Cod: Cape Cod Commission ($50,000)
DEP 319 grant program (https://www.mass.gov/service-details/grants-financial-assistance-watersheds-water-quality)	Cape Cod: Brewster ($105,000) (Cape Cod)

- Federal grant programs like EPA's environmental education grant program. MassBays Central Staff has applied for and secured funding from NOAA, though that agency is not mentioned in the 1994 document. Availability of funds for these programs is decreasing, however.

State Grants

- Environmental bonds. In 2018 MassBays' Management Committee worked with the legislature to include $660,000 per year as match to EPA's §320 grant allocation. The bill was signed by the Governor, so the funds are authorized but not yet allocated. Any future advances will require advocacy by MassBays' supporters.

- Municipal incentive grants; parks and watershed improvement grants. A contemporary equivalent to the Municipal Incentive Grants Program is the Municipal Vulnerability Program Grants, which have been targeted successfully by the RCs and municipal partners. During the 2017 and 2018 funding cycles, RCs assisted municipalities to secure more than $1.5 million in state funds for projects aligned with the CCMP through the following programs:

State Coastal Resiliency Grant Program (https://www.mass.gov/service-details/coastal-resilience-grant-program)	Upper North Shore: Newbury ($225,840), Essex ($75,000), and Newburyport ($122,695)

[55] Northbridge Environmental Management Consultants and the Massachusetts Bays Program Staff, *Financing the Massachusetts Bays Program Comprehensive Conservation and Management Plan: Federal, State, and Local Funding Sources and Mechanisms*, December 1994.

Coastal Pollutant Remediation Grant Program (https://www.mass.gov/service-details/coastal-pollutant-remediation-cpr-grant-program)	South Shore: Kingston ($161,288) and Plymouth ($175,000)
Massachusetts Municipal Vulnerability Preparedness (MVP) grant program (https://www.mass.gov/municipal-vulnerability-preparedness-mvp-program)	Upper North Shore: Newbury, Ipswich, and Essex ($60,000); Gloucester ($107,044) Lower North Shore: Peabody ($224,216), Peabody ($243,400), Salem ($345,000), and Manchester-by the-Sea ($88,180)
Cape Cod Commission District Local Technical Assistance (DLTA) grant (http://www.capecodcommission.org/index.php?id=50)	Cape Cod: Wellfleet ($20,000)
Massachusetts Environmental Trust (https://www.mass.gov/orgs/massachusetts-environmental-trust)	Lower North Shore: Manchester-by the-Sea ($41,885)

Private Funding

- Foundation grants. Few private foundations will support government agencies.

- Corporate funds. Government agencies are not allowed under ethics laws to solicit corporate funds.

As is the case for many of the funding options included in this section, while MassBays has little direct access to private funding, our partners do have access and already take advantage of these resources. MassBays' past efforts to establish an associated nonprofit "Friends" group as a means for accessing these types of funds for CCMP implementation was not successful for multiple reasons, including the crowded field of environmental nonprofits in Massachusetts.

In relation to this source of funding, the Subcommittee discussed Tampa Bay NEP's partnership with Restore America's Estuaries, a national nonprofit with a mission similar to the NEPs'. RAE solicits and distributes private funds for CCMP implementation in cooperation with the NEP. The funds do not flow directly to the NEP, but instead can be considered match in some cases, or at least leverage (see next section).

Revenues

- Taxes and fees. MassBays is not in position to propose these types of revenue streams, which require legislative action. Where our partnering agencies (e.g. DMF, DER, and DEP) already are supported by user fees and in-lieu-fees, MassBays can encourage spending to meet the CCMP's goals. Two specific proposals in the 1994 document are a real estate transfer tax and mooring fees.

- Fines. EPA's Supplemental Environmental Project program, through which monetary penalties are directed toward on-the-ground work, has become less and less accessible over the course of the past 20 years. For the most part, SEPs tend to be "surprises," brought to the table by legal counsel rather than program staff.

- Corporate donations. Government entities are not allowed to accept corporate donations, though they can partner with business to achieve goals. MassBays has benefitted from a partnership with SeaTrac, for example, receiving free time on their new autonomous monitoring vehicle. Note that MassBays did not directly solicit this contribution (which could be a violation of ethics laws), but rather applied for the in-kind services via a competitive grant.

- Partnerships with academia. MassBays has applied for Federal grant monies with academic partners. College- and graduate-level interns (both paid and unpaid) have produced valuable products for MassBays. These benefits do not fall under the category of "revenues," but instead can be in-kind match to the §320 funds.

Financing Mechanisms

- Special betterment or utility districts. Massachusetts' process for establishing special districts across towns is complex and requires several steps for approval. Cape Cod (Barnstable County) has been successful in applying as a special district to generate revenues for land protection (through a real-estate transfer fee, the model for the state-wide Community Preservation Act enabling legislation) and most recently (pending legislative passage), habitat restoration (through a tax on local home rentals). MassBays has promoted stormwater utility districts in individual towns and regionally as a means to generate funds for stormwater management and infrastructure.

- Enterprise funds. Enterprise funds hold monies that are collected and spent separately from the general budget. The 1994 report provides Marblehead's Harbor and Water Fund as a case study. Revenues include boat excise taxes and mooring fees, dockside storage fees, and space rental at the yacht club; expenditures include boat pump-out facilities, and dock operations and maintenance.

- Bonds and loans. The primary example of this type of financing is the State Revolving Loan Fund Program established under the CWA and administered by the states. Massachusetts' Clean Water and Wastewater SRFs regularly receive requests for funding that outstrip available funds, due to the age of Massachusetts' water infrastructure, and the extent of the need among the Commonwealth's 351 cities and towns. Any loan application requires a dedicated source of funding for repayment, a significant hurdle for MassBays. These types of financing mechanisms are better left to the municipalities.

Direct State Funding

The Finance Subcommittee noted that the 1994 report did not address the significant role that could be played by the Commonwealth itself. MassBays, especially through its regional service model, provides consistent technical assistance to municipalities (including support in securing funding as detailed above under Federal Grants and State Grants, on a variety of issues, from stormwater management, to coastal habitat protection and restoration, to community education and outreach on coastal issues, and to goal-setting for local habitats and water quality. For example, MassBays reached 45 of the 50 communities in the MassBays region with training about stormwater management in 2015, and in 2016 we collaborated with MassDEP and MassDOT to provide 40 municipalities with grantwriting training.

The Subcommittee asserts that Commonwealth operating and capital funds should be directed to MassBays in recognition of the role the NEP plays in providing local services. Such funds should be provided to fulfill the §320 match requirement of 1:1 funding from the NEP. Setting the stage for this investment, the Finance Subcommittee advocated for, and secured, a $660,000 per year line item in the 2018 Environmental Bond Bill. The Finance Subcommittee asserts that Management Committee and

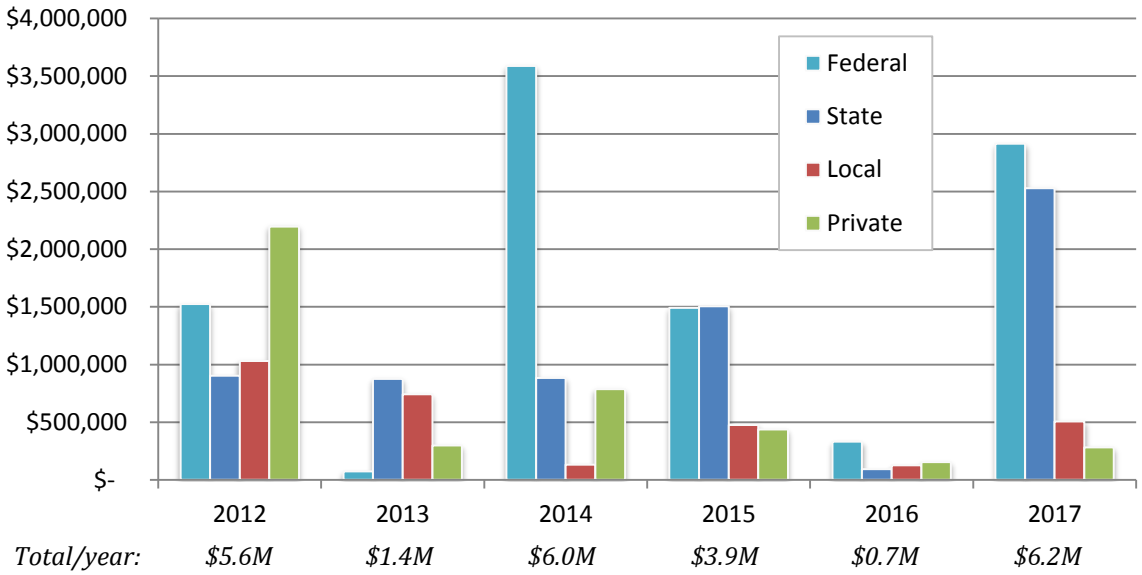
Regional Service Provider representatives should advocate for the annual release of the designated funds. Such funds should be programmed with input from the Executive Director.

Direct funding versus leverage

MassBays' Executive Director has suggested (see Attachment B) that MassBays' finance plan should not be focused entirely on securing monies to be brought in-house and redistributed. It should also establish means for tracking and reporting on outcomes gained through the significant leveraged resources MassBays gains to support CCMP implementation.

Each year, MassBays provides a tally of federal and state funds leveraged with §320 funds to EPA through the NEPORT system. Funds and in-kind resources move the region toward meeting the CCMP goals when RCs and staff work with municipalities to secure grant funding, recruiting volunteers to conduct monitoring and restoration, and work with state and federal agencies to prompt spending. Figure 4 illustrates leverage reported by MassBays from 2012-2017 where staff had a primary (leading), significant (active), or supporting (minor) role.

Figure 4. Sources of Leverage, 2012-2017



Recommendations

[The following recommendations should be articulated in the form of targets and measures, with level of effort associated with each.]

1. MassBays should have as a primary objective maintaining eligibility for §320 funding as a National Estuary Program.

2. MassBays should participate in efforts to ensure continued provisions for §320 funds in congressional budgets, especially through the Association of National Estuary Programs (ANEP). ANEP routinely generates letters of support from Members of Congress for continued funding of NEP, and though they are likely supportive, not all Massachusetts coastal Representatives or even both Senators have signed those letters. MassBays staff should provide information to both the Federal and State legislature regarding programming and funding needs; Massachusetts' DC lobbyist should be aware

of NEP funding needs in Federal budget discussions. The Management Committee should also participate in this education and outreach effort to legislators.

3. MassBays should include "wish lists," or descriptions of what could be accomplished with additional funds, as a section in its annual workplan.

4. The Management Committee should advocate for operating and capital funds to support MassBays' work and to meet the required 1:1 match for §320 funds. MassBays should be included in the Green Budget proposal developed annually by a consortium of environmental nonprofits.

5. MassBays' matching funds should include in-kind support from agency partners like DMF, DEP, and DER (where those efforts are not already funded by Federal dollars).

6. MassBays should identify and quantify the benefits provided to local communities and the Commonwealth as a whole through technical support and local assistance efforts.

7. MassBays should continue to explore opportunities for partnerships that bring private funds to projects that advance its goals.

8. MassBays Regional Service Providers should explore potential local funding streams, like Community Preservation Act funds, mooring fees, and utility districts.

9. MassBays' EPA Region 1 Program Coordinator should bring NE NEPs' CCMPs to the table when negotiations about specific SEPs are underway.

10. MassBays should discuss with CZM and EEA the potential for and feasibility of corporate partnerships, emphasizing the need to make the partnerships mutually beneficial through press coverage, etc..

11. Education and outreach by MassBays should ensure that municipalities apply SRF loan monies to advance the CCMP goals.

12. EPA Region 1 and Headquarters should acknowledge the funding constraints on NEPs hosted by government agencies, and recognize leveraged resources as valid option for diversifying the sources of funding for CCMP implementation. MassBays should continue to document state and federal funds leveraged with EPA's §320 investment, even if EPA discontinues this reporting requirement.

13. While the CCMP is designed to be implemented based solely on EPA funding, the Management Committee should assist staff in maximizing the impact of the CCMP across the planning area. This requires maximizing MassBays' ability to secure additional project funds. In the course of discussions, the Subcommittee identified tasks and projects that are more easily described and more likely to be funded as stand-alone efforts. Several aspects of MassBays' cutting-edge effort to set out targets for individual embayments would be good candidates for proposals, for example, as well as the capacity-building efforts planned for the Citizen Monitoring Coordinators' Network.

14. The task of identifying additional funding and resources is challenging regardless of how MassBays is organized; its position in a state government agency creates additional constraints. The Management Committee should address constraints on diversification of funding, evaluate the extent to which those constraints are offset by the benefits by its position in a state government agency, and identify alternatives that would eliminate or mitigate those constraints without losing the benefits.

Attachment A
EPA 2016 Guidance:
Components of a National Estuary Program Comprehensive Conservation and Management Plan

CCMPs are living documents and as such should be re-examined and revised on a regular basis. EPA recognizes that CCMPs are also critical components of the NEP model of adaptive management as it facilitates a continual process of integrating new data and results. EPA expects that revised CCMPs will discuss the relevance and applicability of the: 1) monitoring, 2) habitat, 3) finance, and 4) outreach component strategies, including any needed substantive changes. If such changes are not discussed in the revised CCMP as language within a chapter or as a separate Action Plan, they should be described in a separate document and completed within 3 years of the final Revised CCMP.

1.____ Include a Monitoring approach to track and detect changes and/or improvements within the study area (so change in environmental indicators can be detected over time), and effectiveness of CCMP Actions. This can be described in a separate, brief, higher level document, or chapter or action in the CCMP. The Monitoring approach should identify: a) objectives, b) data the NEP and partners are collecting for which parameters; c) the party/parties responsible for collecting the data; d) frequency of collecting and reporting the monitoring data; e) how the data are shared, reported, and used; f) data gaps; and g) additional funding needed for monitoring activities and filling data gaps. This section should explain how monitoring has/will change as a result of new/modified actions and priorities, and any new environmental indicators. Monitoring should be tied to the State of the Bay Report which has similar components. **Please note**: A Quality Management Plan or Quality Assurance Project Plan can supplement the Monitoring Plan, but does not in and of itself meet this requirement.

2.____ Include a Finance strategy that will establish long-term financial sustainability to implement the CCMP through diverse resources and partners. The strategy can be a separate document or chapter or action in the CCMP. The strategy should discuss: a) priorities for funding; b) current funding and other support such as staff assignments, or in-kind partnering; c) short- and long-term resource needs; and d) proposed actions or strategies to maintain or garner new resources for CCMP implementation and their timeframe.

3.____ Include a Habitat Protection/Restoration strategy. The strategy should clearly tie back to habitat or ecosystem issues addressed in the CCMP, including those habitats and species prioritized for protection and or restoration efforts. Strategies can be addressed in a separate document or as an action in the CCMP and should discuss: a) relevant habitat types and key species in the study area; b) goals and measurable objectives to address them; and c) actions that reflect a climate change vulnerability assessment. The Strategy can make it easier for NEPs to plan and report on their habitat protection results under GPRA.

4.____ Include a Communication/Outreach Strategy to ensure community involvement and ownership in CCMP implementation that can be represented as a stand-alone document, chapter, or a series of actions in the CCMP that includes: a) guiding principles, or goals and objectives; b) a target audience(s); c) a narrative description of activities, including any tool used such as branding and messaging, behavior change campaigns, or social media; d) implementers for those activities; e) any key deliverables, and f) a budget and timeframe for implementing the activities.

NOTE: Make sure to include a public review process that extends beyond the Management Conference members. Responses to comments should be summarized and be made publically available.

Attachment B
***Toward a* MassBays Finance Plan**

Prepared 2014 by Pam DiBona for consideration by the Management Committee

Finance Plan Requirement

EPA, in its 2012 Program Evaluation Letter dated November 28 2012, directed MassBays, as a condition of meeting the Financial Element of the next evaluation (scheduled for 2017), to

> "…have in place a Finance Plan or business plan that identifies new and diverse sources of funding. The plan could also include a call for Management Committee members and other partners to assist more than they do now in garnering other sources of funds or in-kind support…"

In addition, EPA's 2016 Guidance for preparation of Comprehensive Conservation and Management Plans calls for a:

> Finance strategy that will establish long-term financial sustainability to implement the CCMP through diverse resources and partners. The strategy can be a separate document or chapter or action in the CCMP. The strategy should discuss: a) priorities for funding; b) current funding and other support such as staff assignments, or in-kind partnering; c) short- and long-term resource needs; and d) proposed actions or strategies to maintain or garner new resources for CCMP implementation and their timeframe.

EPA Headquarters hosted a panel discussion about finance options at the annual gathering of NEPs in February 2013. All invited panelists represented NEPs that are stand-alone nonprofit entities; they shared suggestions for hosting fundraising events and silent auctions, collecting dues from Management Committee member organizations, establishing fees for service, and holding recreational events that require entry fees. Unfortunately, this session was less useful to those NEPs hosted by government agencies and universities, entities prohibited or otherwise restricted from taking advantage of these fundraising methods.

Following that meeting, MassBays and its sister programs have sought to provide EPA staff with insights into the varied financial structures encompassed by the NEPs. In preparation for the 2014 annual meeting, for example, I conducted a survey of NEPs to document fundraising potential among the programs, based on their structure. During the meeting, we shared the results of the survey (see figure attached) and hosted breakout conversations based on organizational sector to share commonalities and best practices (unfortunately EPA staff did not participate in the breakouts!). The bottom line: the potential fundraising capacity of NEPs is not equal across sectors, and so a one-size-fits-all fiscal plan will not serve all purposes.

This document examines how our current and future program funding can meet the spirit of EPA's 2012 Program Evaluation letter and CCMP requirements in light of our own funding situation, and identify opportunities for project-based funding to address our CCMP goals.

Introduction and overview

Objectives

1. Hire one additional Central Staff person responsible for Outreach and Communications
2. Establish and maintain funding for monitoring data collection and analysis
3. Increase funding for Regional Service Providers
4. Increase funding for Healthy Estuaries Grant Program

5. Increase MassBays' reported leveraged resources

Steps toward meeting our objectives

1. Strengthen and expand the scope of existing partnerships
2. Form new, larger-scale collaborations to support fundraising (including §320 allocations)
3. Carry out consistent and creative grantwriting

MassBays Finance Plan Objectives

1. Hire one additional Central Staff person responsible for Outreach and Communications

A primary function of MassBays, and a central goal of our CCMP, is to conduct outreach and share findings with decisionmakers at the state and local level. Our Regional Service Providers are excellent ambassadors to local governments and community groups, and we do not need to duplicate their efforts. Their work should be supported from the Boston office, however, with common messaging and materials. Our current staffing is not adequate to assist the RSPs in this way, nor do we have the capacity to carry results of MassBays-funded research efforts to state decisionmakers, or to share accomplishments and opportunities with the larger community. The recently launched monitoring network will require ongoing and increasing "care and feeding" as we secure funding (see below) to build regional capacity.

2. Establish and maintain funding for monitoring data collection and analysis

The Clean Water Act directs NEPs to periodically document environmental trends and conditions. For MassBays, covering three bays and 47 sub-embayments along 1100 miles of Massachusetts coastline, this represents a massive undertaking that is beyond our reach. We have traditionally relied on sister government agencies to provide us with information about water quality, habitat condition, and species status. Government-led monitoring programs, however, are focused on regulatory need, and over time have encompassed a narrower set of parameters and geographic range, so MassBays has turned to citizen monitoring carried out by community-based environmental organizations. These groups have, by default, become the primary source of current water quality and pathogen data for most of our region. In addition to meeting the State-of-the-Bays reporting requirements of our funding, we seek to bring volunteer-generated data—which in many cases have been inaccessible to decisionmakers—to bear on policy and management decisions.

It is not sustainable, nor will we receive robust data sets, if we simply acquire others' data sets and walk away. We must provide direct and in-kind support to these partners to ensure ongoing and reliable monitoring. When MassBays solicited input via the Citizen Monitoring Coordinators' Summit, organizational needs ranged from tools for data management, to grantwriting to fund equipment and lab services, to assistance with statistical data analysis. In response, we have established a new MassBays Monitoring Network to meet these needs and support long-term monitoring in coastal watersheds.

3. Increase funding for Regional Service Providers

The diversity of our NEP makes planning difficult, but it also represents opportunities. We have a ready-made testing ground for new approaches to habitat protection and restoration, with urban, suburban, and rural watershed land use; sandy, rocky, and marshy near-shore habitats; and a multitude of existing partners, from local nonprofits to academic and research institutions. MassBays can create and identify opportunities

for joint grant proposals among the RSPs, and between RSPs and their regional stakeholders, to address priorities identified in the new CCMP. Partners' programs funded through multi-partner grant proposals could be counted toward our fiscal planning goals, even if MassBays receives no direct funding, if we serve as facilitator of the partnership, and provide in-kind support to the effort.

4. Increase funding for Healthy Estuaries Grant Program

MassBays' small-grant program is an important means for supporting local activities aligned with our CCMP to generate environmental improvements in our planning area. Previously called the "Research and Planning Grant Program," these funds have jump-started regional coalitions (e.g., the Herring Network), funded stormwater design and planning (e.g., Kingston's town-wide needs assessment and prioritization), and supported research relevant to state policy (e.g., impacts of docks and piers on salt marshes). In its first year as the Healthy Estuaries Grant Program, the focus was on characterizing local habitats (e.g., herring habitat preference in newly restored river systems) and the relationship of land use on water quality. In future years, the RFR will direct applicants to implement the CCMP, especially characterizing existing conditions, filling gaps in our understanding, and working toward ecosystem targets.

5. Increase MassBays' reported leveraged resources

MassBays' Regional Service Providers consistently provide matching funds and in-kind support, and access to leveraged resources, for an average from 2003 to 2015 of $9 for every $1 granted by EPA. This is half of than the national average for NEP leveraging success. While this disparity is likely due to several factors, MassBays could increase this average – first by documenting leverage fostered through our Healthy Estuaries Grant, and in the future by catalyzing even more investment into meeting our CCMP goals. Obtaining formal commitments to implementing CCMP actions from partners would formalize leveraging.

Attachment C
Sarasota Bay National Estuary Program Fiscal Plan

(Approved by EPA HQ September 2017)

SARASOTA BAY ESTUARY PROGRAM
LONG RANGE FINANCE PLAN - SEPTEMBER 2016

1. Introduction

This document is in response to the September 2015 directive from the Policy Board to develop and implement a long-range financial plan for the Sarasota Bay Estuary Program (SBEP). This plan will be applicable in FY18, and is intended to provide options and opportunities for new revenue sources for implementing the Comprehensive Conservation and Management Plan (CCMP) revised in 2014.

Sarasota Bay was significantly degraded by 1950 due to dredge and fill activities and marsh drainage occurring in the 1920's through 1950's. The next phase of the Program will address these problems by focusing on shoreline naturalization and tributaries while building upon past efforts that improved water quality and seagrass coverage in the bay.

This strategy addresses funding for:

- Program operations
- Technical and outreach projects
- Implementation of the 5-year habitat restoration plan
- Updated research priorities
- Implementation of SBEP projects identified in the Southwest Florida Regional Ecosystem Restoration Plan
- Preparation of a revised CCMP incorporating tidal creeks, living shorelines and a climate vulnerability assessment

The following assumptions have been made in developing the plan:

- Local contributions will not increase, maintaining the existing Interlocal Agreement (IA)
- National Estuary Program (NEP) reauthorization through 2022 will increase federal funding in the future beginning in FY18
- The cash-only policy for SWFWMD cooperative funding is maintained with the SBEP

This Long-Range Finance Plan recommends that the SBEP:

- Continue to seek grant funds for Sarasota Bay projects
- Establish a Florida Estuaries Alliance to pursue additional funds for projects
- Establish a Sarasota Bay Environmental Fund
- Continue to seek funds from the BP oil spill settlement for major projects in the region

- Apply any increase in federal appropriations to specified programmatic priorities.

The SBEP budget for 2017 was set at the May 2016 Policy Board meeting. The recent reauthorization of the National Estuary Program (NEP) by Congress provides opportunity for additional funding for NEPs. Prior to fully addressing operations and in-house (technical and outreach) project needs, the SBEP recommends waiting until Congressional staff and EPA fully deliberate on NEP reauthorization; and the allocation to each of the 28 NEPs is set for 2018. The EPA/Congressional deliberations will also result in criteria development for additional EPA funds to be available through a competitive pool for projects at the national level. Therefore, full implementation of this plan is proposed for the 2018 fiscal cycle.

2. Program Accomplishments

Using the funding sources described in this document, much has been accomplished by the program and partners since the program was initiated in 1989. The SBEP Policy Board set an "action now" agenda in 1989 and since the Program has been the catalyst for action:

- 67% reduction in nitrogen pollution
- 51% increase in seagrass coverage to levels 41% above 1950 (5000+ acres new acres of seagrass and 6000+ more acres of continuous beds)
- systematic progress toward elimination of wastewater discharge (one discharge remaining) to the Bay (an objective added in 2014)
- delisting of Sarasota Bay as "impaired" with water quality rated good/excellent
- 90 habitat restoration project sites (creating reefs, oysters and wetlands)
- Establishment of 34 ecological parks for public enjoyment
- educating 60,000 of our local school children on the fragile nature of our environment since 2004
- construction of stormwater projects (including the Celery Fields regional system, North Water Tower Park and the Dona/Roberts Bay system - Cow Pen Slough) to reduce flooding and pollution
- implementation of Florida Friendly Landscaping and fertilizer ordinances to minimize impacts of urban landscaping on the Bay

The Bay, tributaries and watershed are improved since 1989.

3. Vision - Future Program Focus

The future of Sarasota Bay remains bright given the pollution control and resource management programs in place. Given the large-scale reduction in nitrogen pollution and seagrass recovery, the Program has shifted focus to the restoration of tributaries and creation of living shoreline habitats.

Several large grants have been received focusing on the development of Numeric Nutrient Criteria for tidal tributaries including a recent EPA Wetlands Program Development Grant ($288,000) to be implemented in FY17. Meanwhile, the Citizens Advisory Committee (CAC) recently conducted a priority setting survey selecting living shorelines as the top priority for programmatic consideration. The living shorelines initiative blends well with the tributary initiative as hardened shorelines, including seawalls and bulkheads, extend up into the creeks. The tidal creek studies have also determined larger utilization of creeks than expected by juvenile fishery.

Mote Marine Laboratory is currently assessing fishery in Phillippi Creek as a pilot in addressing fishery utilization in relation to habitats for the SBEP. Scheda Ecological is currently preparing a Living Shoreline Primer for application regionally.

4. Finance Background

5. Program History

The Sarasota Bay National Estuary Program (SBEP) began in June 1989. Federal funding for the Program was initially appropriated by Congress through section 320 of the Water Quality Act of 1987. Although there are 28 NEPs, Sarasota Bay was one of six National Estuary Programs (NEPs) listed in the Act. Federal funding through section 320 has oscillated over the years, from a low of $200,000 in the mid 1990's to $600,000 today.

Local governments and SWFWMD pledged financial support in 1990, providing $266,000 annually which supplemented federal funds. Local funding has increased modestly ($30,000) over the same period with the addition of the City of Bradenton and the Town of Longboat Key in 2004 contributing $15,000 each. These funds have been used for internal operations and projects described later in this plan. In recent years, the SBEP has had to use reserves and grants to maintain operations and projects in addressing numeric nutrient criteria while absorbing cuts in federal allocations.

For the first five years (1989-94), the SBEP focused on assessing the health and ecological condition of the Bay proper and its watershed. Based on this assessment, a plan was developed that outlined a strategy for the management and restoration of the Bay. The first two federal (EPA) grants for the SBEP were "passed through" the Florida Department of Environmental Protection (FDEP). At that time, the Governor and FDEP Secretary assigned responsibility to SWFWMD for program management. This disconnect resulted in complications in contracting, lack of working capital and reimbursement issues. Most of the technical work was, therefore, funded directly from EPA to local contractors selected through competitive processes, while staff salaries and benefits were covered by a contract between SWFWMD and FDEP. There were also several State Legislative appropriations used to provide working capital allowing the program to fund projects beginning in 1993. "Action now" became a principle theme of the SBEP as a number of Early Action Demonstration Projects were funded by EPA and other partners for construction.

In 1993, the Sarasota Bay Framework for Action was released. At that time, it was recognized that a substantial public investment (Capital Improvement Projects) would be required to reduce nitrogen pollution (estimated in 1995 as 680% above pristine), improve water quality and restore the ecological integrity of the Bay. The CCMP outlined specific actions assigning responsibility for implementation to SBEP staff and partners including: septic to sewer program(s); wastewater treatment plant consolidation; reclaimed water systems; storm water retrofit; restoration of reefs, oysters and wetlands; and environmental educational programs to address homeowner pollution and resource protection. The estimated cost for restoration was set at $500 million.

6. Initial CCMP Implementation - Financing

EPA literature and guidance documents on financing marine and estuarine protection suggested that successful programs needed to identify appropriate funding source(s) to meet each main objective, develop a competitive edge to leverage funds from multiple sources, and influence regional policy to support financing the CCMP.

The SBEP CCMP (1995) incorporated these strategies and established responsibilities for local governments to support this comprehensive regional action. Task forces were established for each of the six Action Plans, which were incorporated into local Comprehensive Plans, thus establishing policy, funding and staff opportunity to participate in SBEP directed restoration.

The SBEP and local partners identified funding sources that would be most appropriate to support particular action items within each of the six CCMP Action Plans. These sources included:

- State Revolving Loans*
- Utility Fees
- P2000/Florida Forever*
- State and Congressional Appropriations*
- State Grants*
- Local taxes
- State SWIM funds*
- FDEP fines (Pollution Recovery Trust Funds)*
- Mitigation - Permitting Actions
- US Army Corps of Engineers (Section 1135)*
- Manasota Basin Board Initiatives*
- Special Assessment Districts (Wastewater and Storm-water projects)
- Stormwater Environmental Utility fees
- NOAA Community Based Grants*
- Private Contributions*
- Penny Sales Tax
- EPA (Climate Ready and other) grants
- SWFWMD Cooperative Funding (50/50 matching above)*
- SWFWMD New Water Source Initiative*
- EPA Wetlands
- EPA Non-Point Source Grants (restricted)
- US F&WS restoration grants
- FWC (Fresh and Saltwater grants)
- EPA Gulf of Mexico Program grants

*no longer available to SBEP

In 1996, it took approximately one year to decide to maintain the SBEP staff. Afterward, the Policy and Management Board members and additional local/state government staff worked in tandem with SBEP staff to implement the CCMP. The funds for Bay improvement were leveraged using the sources above.

In 1996, Sarasota Bay became a SWFWMD Surface Water Improvement Management (SWIM) waterbody. This designation made state and regional funds available for CCMP implementation. The SWFWMD Manasota Basin Board (now dissolved) strongly supported CCMP implementation and provided restoration funding every year. The Manasota Basin Board also provided a significant share of the capital improvements financing regional reclaimed wastewater and stormwater projects while County natural resource departments worked in concert with the SBEP, FDEP and SWFWMD-SWIM staff supporting major habitat restoration projects throughout the watershed.

7. Current Operations

8. SBEP Interlocal Agreement

In 2004, the SBEP Interlocal Agreement (IA) was approved establishing the Sarasota Bay watershed as an Independent Special District in Florida. The Agreement also established funding commitments for each party in the agreement and combined with the federal allocation form the base program.

Sarasota County	$50,000
Manatee County	50,000
City of Sarasota	33,000
City of Bradenton	15,000
Town of Longboat Key	15,000
SWFWMD	133,000
Total	$296,000

9. Federal Allocations (Congressional Appropriations)

Since 1995, the annual federal appropriation for each NEP has increased from $200,000 to a maximum of $828,000 in FY10. Through the collective participation of local governments and education efforts through the Association of National Estuary Programs (ANEP) comprising the 28 NEP directors, NEP appropriations have received bi-partisan support in Congress. Federal funding was affected, however, by the recession beginning in 2006, resulting in reduced programmatic allocations approximating $400,000 (FY 06 and 07) and a leveling between FY11-15 approximating $538,000 - 598,000 annually. In FY17, funding has been set at $600,000 but should increase beginning in FY18 to levels above $750,000 if Congressional appropriations are maintained at FY17 levels.

10. Annual Base Program – NEP Workplan

Below is the operating budget for next fiscal year beginning October 1, 2016. The budget identifies programmatic revenues, in-house expenses and projects to be implemented with base program funds. It is anticipated that the internal budget will modestly increase over the years with inflation. However, EPA revenue is expected to increase to levels approximating $750,000 beginning in FY 18 or 19 as compared to $600,000 today.

FFY16 WORKPLAN BUDGET SUMMARY (FY 17 Operating)

REVENUES:	
EPA	$600,000
SWFWMD (SWIM)	133,000
Manatee County	50,000
Sarasota County	50,000
City of Sarasota	33,000
City of Bradenton	15,000
Town of Longboat Key	15,000
Interest	4,000
SBEP	20,000
In-kind match	282,000*
TOTAL:	**$1,202,000**

SBEP OPERATING/INTERNAL ADMINISTRATION EXPENSES:

Direct Personnel Expenses	$347,940
Other Personnel Expenses	174,050
Travel/Conferences	23,000
Office Supplies	4,700
Contractual	
Computer Support	12,800
Contract Procurement	1,000
Legal Services	10,000
Accounting/Auditing	20,000
Payroll Services	2,200
Banking Fees	200
Liability/Workers Compensation	7,800
Operations	
Lease	30,000
Copier/Postage Machine Lease	6,000
Telecommunications	9,000
Postage/Courier	1,610
Advertising	1,500
Capital Expenditure	4,800
Subscriptions/Dues	6,400
Printing/Duplicating	1,700
Repair	300
Other	2,800
TOTAL EXPENSES:	**$667,800**

ONGOING PROJECTS– ADDITIONAL FUNDS REQUESTED

Public Outreach and Education	$7,200
Citizens Action– PIER	120,000
Oysters/Scallops/Living Shorelines	10,000
TMDL (WQ Targets)/Tributary Restoration	30,000
Wetland Restoration	5,000
Fishery Independent Monitoring	50,000
Wetlands – Coordination	30,000
SBEP Operating/Administrative Costs	667,800
Wetlands – Restoration Match	282,000*
TOTAL:	**$1,202,000**

*Request that up to $700k from other local projects be used as Federal match at the discretion of the program through wetlands restoration, stormwater, land acquisition, etc.

Annually, despite oscillation in the federal allocation, the SBEP has used reserves and grant funds to support operations and projects approximating $900,000 annually supplemented by in-kind match approximating $300,000 per year comprising the base program. Supplemental grant funds

approximating $500,000 - $1 million have been secured by the SBEP resulting in total annual budgets approximating $2.3 million annually.

The base work plan has supported multiple major projects over the past five years, including development of numeric nutrient criteria in Sarasota Bay and its creeks and tributaries, development of an optical model for assessing seagrass coverage in Sarasota Bay, construction of multiple artificial and oyster reefs in Sarasota Bay and the offshore Gulf, assessments of the stocks and diversity of finfish in Sarasota Bay, an Economic Valuation Study to assess the value of Sarasota Bay's natural resources, and various outreach and education projects to foster public involvement in the program.

11. Impact of External Grants

Over the past several years, the SBEP has been able to accomplish its many projects and programs at the same level of support by successfully competing for grants at the state and federal level. When allowable, these grants have included a percentage (usually 10%) of the total grant amount to be used for costs associated with managing the grant (staff salary, travel, incidentals, etc.). This has helped offset some of the general programmatic expenses normally charged to the annual EPA grant. These offsets will help increase reserves in the future.

The SBEP is currently eligible for nine of the twenty-five grant programs that were available to the Program in the 1990's. Table 1 summarizes the most recent grant applications:

Table 1: SBEP External Grant Applications

Funding Source	Project Summary	Status
EPA Gulf of Mexico Program	Stormwater LID at North Water Tower Park; City of Sarasota	Awarded: ($300,000; $1.4M total)
USF&WS Coastal Program	Exotic removal at North Lido Beach	Awarded: $10,000
EPA Climate Ready Estuary Program	Assess effects of climate change on CCMP implementation	Awarded: $29,000
FFWC Artificial Reef Program	Fish monitoring at three artificial reefs in Sarasota Bay	Awarded: $50,000
FFWC MEHMRA Program	Construct oyster habitat in Sarasota Bay	Awarded: $20,000 (FWC will manage)
FFWC AHRES Program	Completion of Big Lake restoration at Oscar Scherer State Park	Not awarded to SBEP
NFWF Gulf Coast Conservation Grant Program	Completion of habitat restoration at FISH Preserve	Not awarded to SBEP
EPA Region 4 Wetland Development Grant	Continued water quality work in SW Florida tributaries	Awarded: $288,000

Eligibility for State of Florida 319 grants has also been reduced because of the success in the clean-up (no TMDL high priority impaired water bodies). The scarcity of cash to meet the match requirements of the SWFWMD cooperative funding initiatives has also hindered the SBEP's ability to apply for monies from this program for habitat restoration and other projects. Since SBEP does not own any real property, FDOT mitigation eligibility is eliminated.

12. Funding Priorities

13. Southwest Florida Regional Ecosystem Restoration Plan (SWFRERP)

In 2012, The SWFRERP was developed by the three Florida NEPs to support funding requests to the Gulf Council for Restore Act funding. The Restore Act projects were ranked by the Policy Boards of the three NEPs and recommended for action to the Gulf Council who adopted the projects as federally authorized in 2014. Although some of the projects have been funded, many remain unfunded or partially funded at this point in time including:

- Longboat Key Force-main
- Septic to Sewer Program
- Dona/Roberts Bay Restoration
- Siesta Key Pipeline
- Beaches to Bay Park Restoration
- SBEP Five Year Habitat Restoration Plan
- Bradenton Stormwater Master Plan Implementation
- Sarasota Well Fields

In 2016, the SBEP updated its Five-Year Habitat Restoration plan (Table 2), which will guide restoration efforts through 2022. This restoration plan is included in the SWFRERP. The plan will be amended to support living shoreline initiatives identifying projects for funding consideration.

Table 2: SBEP Five-Year Habitat Restoration Plan

		Cost per Acre	Proximity to Preserved Lands	Potential Restoration Magnitude	Planned Government/Partnering	Construction Feasibility	Potential Fisheries Habitat	Salinity Classification	Water Quality Improvement	Water Retention Improvement	Water Quality Impairment	Tributary	Shoreline Enhancement	Protected Species Benefits	Historic Habitat Improvement	Total Score	Rank	Fiscal Year
Manatee County	34th Street Canal Oyster Restoration	2	1	1	2	2	3	2	2	1	2	1	1	2	2	24	12	2019
	Bayshore Island	3	1	2	2	2	1	1	1	1	2	1	2	2	1	22	18	2020
	Cortez Key Bird Sanctuary*	1	2	1	2	2	3	1	2	1	2	1	2	3	3	26	7	2018
	Dit-Dot-Dash Bird Islands*	1	1	1	2	2	3	2	2	1	2	1	2	3	3	26	7	2018
	Evers Reservoir	2	2	2	2	2	2	4	2	2	1	1	2	2	2	28	4	2017
	GT Bray Park	1	2	1	2	2	2	4	3	3	2	3	2	1	3	31	1	2016
	King Middle School	3	1	1	0	2	1	2	2	2	2	3	1	2	2	24	12	2019
	Palma Sola West	1	1	3	2	1	2	1	2	1	2	1	2	2	3	24	12	2019
	Tidy Island	1	2	2	2	1	3	1	2	2	2	1	2	2	3	26	7	2018
	Winston Tract	3	2	2	2	3	2	1	1	1	2	1	2	2	3	27	6	2017
Sarasota County	Bobby Jones Golf Course	3	1	1	2	2	1	4	3	3	2	3	2	1	2	30	3	2016
	Edwards Islands	3	1	2	2	1	3	1	1	1	2	1	2	2	1	23	16	2020
	Jim Neville Marine Preserve	2	2	3	2	1	2	1	1	1	2	1	2	3	2	25	11	2019
	North Lido	2	2	1	2	3	2	1	1	1	2	1	2	2	2	24	12	2020
	Phillippi Creek Shoreline	3	1	1	0	2	2	3	2	1	2	3	2	2	2	26	7	2018
	Red Bug Slough	2	2	2	2	2	2	4	2	2	2	3	2	2	2	31	1	2016
	Skiers Island	3	1	2	2	1	3	1	1	1	2	1	2	2	1	23	16	2020
	South Lido	2	2	3	2	2	2	1	2	1	2	1	2	3	3	28	4	2017

Scored under the assumption that artificial reef balls will be used, however, oyster bags are also a viable option.

14. Research

15. Creeks

The SBEP has been working on tidal creeks for several years investigating water quality conditions and the health of creeks in relation to numeric nutrient criteria (NNC). The SBEP proposed a methodology to EPA and FDEP in 2015/16 for NNC in creeks based on extensive technical analysis of 16 creeks in SW Florida. Although the methodology is valued from a management perspective, the use of fishery as an indicator of system health (full aquatic life support and use) was not accepted by EPA. So a revised technical plan of action has been submitted to EPA as a part of a wetland grant proposal. The proposal was recently accepted by EPA for funding. The SBEP is currently evaluating habitats with respect to fishery in tidal creeks for enhanced management decisions.

16. Living Shorelines

Living shorelines became a priority of the program in 2016 based on a CAC prioritization; and the Policy Board approved development of a Primer to enhance the state of knowledge. The Primer will outline the long term research needs for living shoreline implementation.

17. Seagrass

The NEP is completing the optical model for Sarasota Bay providing insight into the current light climate in relation to the current seagrass coverage. Adjustments to the CCMP will be made accordingly.

18. Climate Vulnerability Assessment

The Sarasota Bay area is beginning to feel the impact of sea level rise – particularly the region's storm-water conveyance systems in low lying areas. Sea level is currently rising at about one inch per decade. The recent flooding during tropical event Colin is indicative of the future as Gulf waters warm and sea level rises. EPA (OCDP) has requested that all NEPs become Climate Ready by the year 2020 by assessing the impacts of climate stressors on CCMP implementation.

19. Next Steps

It is envisioned that the Technical Advisory Committee (TAC) will reassess research priorities this fall. There is a need to generated data supporting living shoreline implementation and linkages with fish productivity related to the Gulf.

20. Reserves

Spending policies in Florida and at the national level have changed since 2010, resulting in a reduction in grant funds available to the SBEP. Despite the limited availability of external funding, the SBEP has maintained technical and educational and outreach programs and developed numeric nutrient criteria for water quality protection. Using internal funding for these projects has resulted in a reduction of SBEP reserves by half since 2010 to approximately $300,000 today.

Annual financial audits, coupled with the recent SWFWMD compliance audit, have demonstrated the SBEP to be fiscally sound with approximately six months of reserves available to carry staff into the next fiscal cycle.

The SBEP Policy Board has recently established a goal of maintaining one year of operating reserves approximating $600,000. This goal can be achieved by setting aside $50,000 per year from the NEP authorization.

21. Five-Year Financial Strategy

Below is a proposed five-year plan of action to maintain current operations while implementing the priorities established by the Policy Board over the past several years. The new priorities are:

- Tidal Creeks
- Living Shorelines
- Climate Readiness
- Environmental Education and
- Establishing one-year operating reserve.

The Program is also continuing work on wetland restoration, artificial reef deployment, oyster restoration, and CAC Action Plan implementation.

To meet the goal of one year of operating expenses, the Program will set aside $50,000 per year in additional revenue for reauthorization, cut the projects budget by the same amount or the combination of above. The SBEP will also attempt to replace in-house line items in the base Program budget with grant funds or appropriations from the State Legislature.

Action: SBEP to pursue funds for Fishery Independent Monitoring and other projects that are currently funded with the base program through the Florida Estuary Alliance and Legislature.

22. Best Avenues for Funding SBEP Needs

23. NEP Reauthorization

The recent reauthorization of the National Estuary Program should result in a substantial increase in base program funds for the SBEP through 2022. At present, the EPA, Congressional staff and the Office of Management and Budget (OMB) are discussing the intent of the legislation and the specific appropriations language, which reads:

> *1) IN GENERAL—There is authorized to be appropriated to the Administrator $26,500,000 for each of fiscal years 2017 through 2021 for—''(A) expenses relating to the administration of grants or awards by the Administrator under this section, including the award and oversight of grants and awards, except that such expenses may not exceed 5 percent of the amount appropriated under this subsection for a fiscal year; and ''(B) making grants and awards under subsection (g)'' (2) ALLOCATIONS.—''(A) CONSERVATION AND MANAGEMENT PLANS.—Not less than 80 percent of the amount made available under this subsection for a fiscal year shall be used by the Administrator to provide grant assistance for the development, implementation, and monitoring of each of the conservation and management plans eligible for grant assistance under subsection (g)(2). ''(B) COMPETITIVE AWARDS — Not less than 15 percent of the amount made available under this subsection for a fiscal year shall be used by the Administrator for making competitive awards described in subsection (g)(4).''.*

This translates into each Program possibly receiving $757,000 annually over the next five years. Furthermore, the availability of competitive awards makes possible an additional $141,000 per NEP, assuming those awards are split evenly among programs. This increase in funding is intended primarily for program operations and to supplement project resources in the annual work plans. They may also be directed toward revenue reserves or for staffing considerations.

24. Application of the NEP Reauthorization Increase ($157k)

The following chart provides a prospective five-year plan for implementation of the funds expected from the $157,000 increase in federal appropriations to the NEP in FY18. The plan will be updated in the technical projects media as the prioritization process is completed by the TAC. The chart assumes current staffing with a 3% increase in salaries and benefits and a 1% increase in other in-house expenses.

As shown on the chart below, the Program can carry existing staff through 2022, considering the director will likely retire in 2020 and maintain or increase the current project budgets.

Table 3: SBEP Five-Year Financial Plan

			FIVE YEAR FINANCIAL PLAN*			
SBEP Operating/Project Expenses	2017	2018	2019	2020	2021	2022
Internal Operations						
Direct Personnel	$347,940	$358,378	$369,130	$380,203	$391,610	$403,358
Indirect Personnel	$174,050	$179,272	$184,650	$190,189	$195,895	$201,772
Other Operating expenses	$145,810	$147,268	$148,741	$150,228	$151,730	$153,248
TOTAL	$667,800	$684,918	$702,520	$720,621	$739,235	$758,377
////////////////////////////	////////////	////////////	////////////	////////////	////////////	////////////
External Operations						
Public Outreach and Education	$7,200	$7,200	$7,200	$7,200	$7,200	$7,200
Citizens' Action Plan	$120,000	$160,341	$151,540	$142,490	$133,182	$123,052
Subtotal	$127,200	$167,541	$158,740	$149,690	$140,382	$130,252
Oysters/Scallops/Living Shorelines	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
Tributary Restoration	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000
Wetland Restoration	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
Fishery Independent Monitoring	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000
Wetland Coordination	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000
Other	$0	$42,541	$33,740	$24,689	$15,383	$6,371
Subtotal	$125,000	$167,541	$158,740	$149,689	$140,383	$131,371
Total Projects	$252,200	$335,082	$317,480	$299,379	$280,765	$261,623
Reserves	$0	$50,000	$50,000	$50,000	$50,000	$50,000
Grand Total	$920,000	$1,070,000	$1,070,000	$1,070,000	$1,070,000	$1,070,000
* assumes $157,000 increase from NEP reauthorization						

Action: Staff report to Policy Board on progress in establishing the NEP allocation in January and May 2017.

25. Florida Estuaries Alliance

The mission of the Florida Estuaries Alliance is to implement a long-term programmatic strategy to support priority projects and programs and help meet federal, state and local estuarine restoration and protection goals. Each estuary is guided by a management plan based on best available science and developed with input from scientists, stakeholders and citizens. The Florida Estuaries Alliance will support member governments' implementation of the CCMPs. The Alliance also aims to better inform statewide leaders and the public about the important environmental, economic and cultural assets associated with Florida's estuaries.

Substantial resources may be available to each NEP in establishing the Florida Estuaries Alliance. The Policy Board has requested the Alliance and supporting legislative briefs be further developed prior to pursuing a more formalized alliance/agreement. The Alliance is currently developing a Memorandum of Understanding (MOU) between Indian River, Tampa Bay, Charlotte Harbor and Sarasota Bay NEPs (see attachment #1).

Action: SBEP recommends that the SBEP Policy Board approve the MOU for the Florida Estuaries Alliance.

26. Sarasota Bay Environmental Fund

The Tampa Bay Estuary Program has been successful establishing an Environmental Fund where local governments and private entities contribute to fund environmental restoration projects. Funding is matched by the Southwest Florida Water Management District. Estuary Alliance funds could be used as the match against the District, providing funds for implementation of the SBEP's Five-Year Restoration Plan. Restore America's Estuaries has made a commitment to assist in managing this fund for Sarasota Bay. There has also been interest in sponsoring the fund via the Gulf Coast Community Foundation (GCCF).

Action: SBEP staff pursue the establishment of the Sarasota Bay Environmental Fund with the GCCF.

27. Deep Water Horizon Oil Spill Settlement (Local Infrastructure and Habitat Restoration)

The Deep Water Horizon spill settlement continues to be a source of revenue for this region (16-20 year cycle).

28. Local Claims

Most municipalities in our region have received claims. Some are utilizing these funds for environmental projects.

Action: SBEP will monitor the local projects and support implementation as requested.

29. Natural Resource Damage Assessment ($680 million for Florida)

These funds are to resolve natural resource damage claims. It is uncertain if these funds are available to the areas not directly impacted by the spill.

Action: SBEP will monitor the use of NRDA funds and seek as applicable.

30. Restore Act

31. Pot 1: Local Pool Direct

The Counties are to receive approximately $5 million each from this pool. Timing is uncertain over the cycle.

Action: The SBEP will monitor projects implemented regionally and assist with implementation as requested.

32. Pot 2: Gulf Council Pool

Substantial funds are available from this source. Tampa Bay is the only Florida NEP that has received an allocation. The SBEP continues to pursue these funds, but Sarasota Bay needs to become a State priority per the State Expenditure Plan.

Action: SBEP is establishing relationships with GMP and Gulf Council staff for possible funding.

33. Pot 3: Florida Consortium

The 23 Counties in Florida are developing a State Expenditure Plan to be approved by the Governor to receive funding. The Florida NEPs have developed the Southwest Florida Regional Ecosystem Restoration Plan making projects in the Plan federally authorized.

Action: SBEP is tracking progress to support the Counties as requested.

34. Economic Damages

Governor Scott has established a non-profit entity "Triumph Gulf Coast" to disburse $2 billion in funding for economic damages created by the spill. It is uncertain how these funds will be spent.

35. National Fish and Wildlife Foundation (NFWF) – Gulf Environmental Benefit Fund

In Florida, these grants are currently restricted to the Panhandle and Big Bend areas, but may be opened up as the disbursement process moves forward.

Action: Establish wildlife linkages (migratory patterns) with damages to access NFWF funds.

36. Concluding Remarks

In summary, the SBEP is financially sound with many options for sustaining restoration efforts into the future. The program needs to develop a competitive edge by working in tandem with our state legislative delegation, elected officials, and senior management within our state and local governments.

Action: SBEP requests additional project solicitation to supplement the SW Florida Regional Ecosystem Restoration Plan.

Attachment 3. Monitoring Framework

To be submitted February 1, 2019